Double Pipe Creek
Rural Clean Water Program

Ten Year Report
1991

In Cooperation With:

USDA, Soil Conservation Service
USDA, Agricultural Stabilization and Conservation Service
University of Maryland Cooperative Extension Service
Maryland Department of the Environment
Carroll Soil Conservation District

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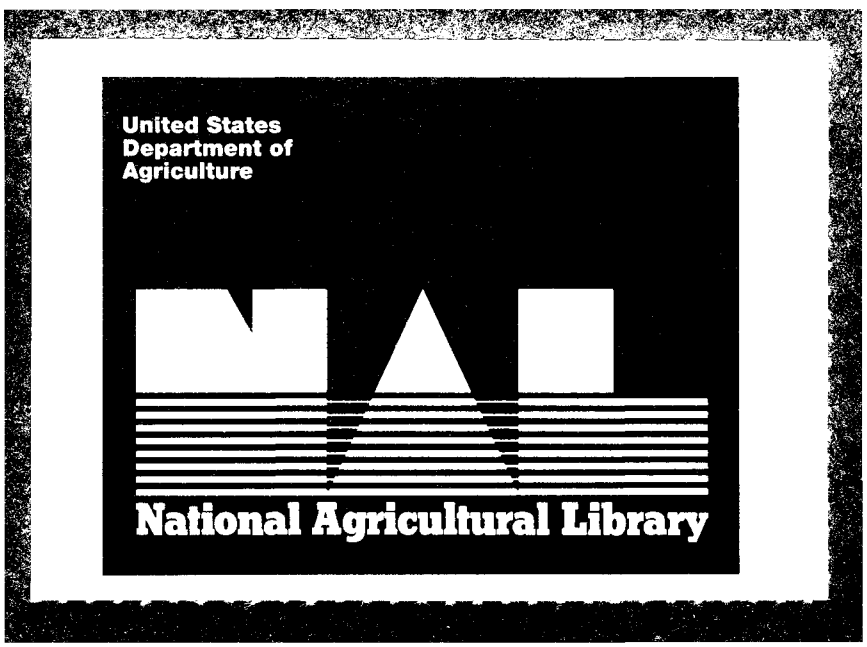
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TEN YEAR REPORT

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EXECUTIVE SUMMARY

The Double Pipe Creek drainage basin in Carroll County is a part of the multi-county Monocacy River basin that runs from within Pennsylvania down to the Potomac River above Washington, D.C. Farm operations need to include erosion control measures in their conservation and water quality plans due to the Piedmont terrain. Known as one of the leading dairy counties within the state, the management of farm nutrients both from livestock wastes and commercial fertilizers is vitally important for good water quality.

Monitoring data collected during the late 1970's indicated turbidity levels were consistently in excess of the state standards. Since sediment is a major contributor to turbidity, this infers that it is also a water quality problem.

In 1980, the National Coordinating Committee selected the watershed as one of 13 Rural Clean Water Program projects in the nation. The primary objective of the project was to improve water quality. The major emphasis was to manage livestock wastes rather than concentrate on sediment reduction. The primary objective was met.

The Local Coordinating Committee coordinated the activities of the participating agencies. The Agricultural Stabilization and Conservation Service (ASCS) administered cost sharing for the project. The Soil Conservation Service (SCS) provided technical assistance. A total of $2,680,366 of cost share assistance has been earned by participants. Information and education (I & E) activities were invaluable aids in explaining the project to landowners, cooperators and the general public and enlisting their involvement. Several agencies participated in I & E activities. The County Extension Service, however, carried the major responsibility. The cooperation of all agencies involved was a large contributor to the success of the project.

Water Quality plans covering 20,273 acres had been written and approved for 149 contracts by the end of the contracting period in 1986. The first priority critical area was farms where livestock and the waste management situation presented a water quality problem and where severe gully erosion existed. The second priority critical area became farms with primarily erosion control problems, due to sheet and rill erosion.

The Double Pipe Creek Project included the following BMP's: permanent vegetative cover, animal waste control facilities, stripcropping systems, diversions, grazing land protection, waterway systems, cropland protective cover, conservation tillage systems, stream protection systems, permanent vegetative cover of critical areas, sediment retention, erosion or water control structures, fertilizer management and pesticide management.

Water quality monitoring was conducted by the Maryland Department of the Environment. Results through 1990 suggest that BMP's implemented under the RCWP in the project area improved water quality in Big Pipe Creek. Concentrations of ammonia, ortho phosphate and total organic carbon decreased in Big Pipe Creek. Total nitrogen and nitrate-nitrite nitrogen concentrations increased during the period. The specific water quality goals of meeting the state standards for turbidity and fecal coliform were not met.

FINDINGS AND RECOMMENDATIONS

* Water quality goals were not set at attainable levels and should have been goals that could have been achieved.

* The setting of the goal for number of contracts was very difficult since it was not known how many and the extent of BMP's that would be involved with each contract.

  It is recommended that future projects center on goals for BMP's and ultimately getting all the BMP's established for each farming operation that are needed for a good water quality system.

* More time should have been provided to assess needs and establish goals during development of the application.

* For projects of this type, where special results are desired, the management staff from the National level, State level and Local level needs to insure that adequate staffing is available to carry out the "special project" without negatively impacting the ongoing local Soil Conservation District program.

* For monitoring goals, the pre-implementation water quality characterization was difficult to attain.

* A wide array of information and educational activities were conducted to promote the Double Pipe Creek Project in Carroll County. A sharing of ideas with some of the other 23 projects may have provided additional mechanisms during the first four years, when it was most needed.

* In the Double Pipe Creek Project, excellent cooperation existed between all the agencies. The LCC and I & E subcommittee had good participation from local farm organizations and public officials. Having I & E funding handled separate through CES worked extremely well and enabled projects to be funded quickly.

* At the end of the sign-up period, much effort revolved around one-on-one contacts. More personnel efforts during this time may have resulted in higher number of contracts.

* A separate budget line should have been developed to provide for the printing of the Annual and Ten Year reports.

* The original guidelines for the project should have clearly shown the expected contents of the yearly, 10 year and closeout reports.

* The tracking and record system could have been better developed at the beginning of the project to facilitate more pertinent data collection in the form latter requested.

* Implementation is correlated to farm income and farm income is difficult to project over a 10-15 year program period.

* Weather cycles also affect farm income. During the project, the project area experienced three serious droughts.

* Availability of contractors with the experience, equipment and ability was not a problem.

* Through the experimental nature of the project, a wide range of innovative options were planned and installed, particularly through BMP 2.

* More personnel were needed to work with landowners and operators concerning the management and maintenance of installed BMP's.

* The flexibility to try new ideas during practice application and the $50,000 payment limitation was a great asset.

* The administration of the project by ASCS was a tremendous advantage since they already had the experience for administering cost sharing programs.

* The agencies roles and personnel changed during the ten year life span of the project. The change in personnel can be noted from the LCC up to the NCC, but changes in personnel seemed to have a minimal effect on the project reaching its original goals and objectives.

* Water quality in Big Pipe Creek improved between 1982 and 1990.

* Instream concentrations of ammonia (NH4) and total organic carbon (TOC) decreased between 1982 and 1990.

* Ammonia (NH4) concentrations in Big Pipe Creek decreased by 44% over the period.

* Total Organic Carbon (TOC) concentrations decreased by 51% over the period.

* Instream concentrations of Total Nitrogen (TN) and Nitrate-Nitrite Nitrogen (NO23) increased between 1982 and 1990.

* Nitrate Nitrogen (NO23) concentrations in Big Pipe Creek increased by 34% over the period.

* Total Nitrogen (TN) concentrations in Big Pipe Creek increased by 25% over the period.

* The results of the monitoring program indicate that the State's turbidity and fecal coliform standards are exceeded regularly in Big Pipe Creek.

* Control of monitoring sites and contract performance needs to be guaranteed for monitoring sites.

2.1 OVERVIEW OF THE RURAL CLEAN WATER PROGRAM

The Rural Clean Water Program (RCWP) is a federally sponsored program designed to control agricultural nonpoint source (NPS) pollution in rural watersheds with the goal of improving water quality. Initiated in 1980, the RCWP was established as a 10 to 15 year experiment offering cost sharing and technical assistance as incentives for voluntary implementation of Best Management Practices (BMP's).

The objectives of the RCWP are to:

* Achieve improved water quality in the approved project area in the most cost effective manner possible in keeping with the provision of adequate supplies of food, fiber and a quality environment.

* Assist agricultural land owners and operators to reduce agricultural NPS water pollutants and to improve water quality in rural areas to meet water quality standards or water quality goals; and

* Develop and test programs, policies and procedures for the control of agricultural NPS pollution.

With a total appropriation of $64 million, the RCWP has funded 21 watershed projects across the country. These projects represent a wide range of pollution problems and impaired water uses. The RCWP projects were selected from state lists of priority watersheds developed during the Section 208 planning process under the 1972 Clean Water Act. Projects are located in Alabama, Delaware, Florida, Idaho, Illinois, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Nebraska, Oregon, Pennsylvania, South Dakota, Tennessee/Kentucky, Utah, Vermont, Virginia and Wisconsin. While water quality monitoring has been performed in all 21 projects, five of the RCWP projects (Idaho, Illinois, Pennsylvania, North Dakota and Vermont) were selected to receive additional funding for comprehensive monitoring and evaluation.

Each project involves both land treatment and water quality monitoring. Landowners were contracted to implement BMPs, with the length of the contract depending on the practice being implemented -- typically three years minimum (e.g., conservation tillage) and ten years maximum (e.g., terraces, animal waste management systems). Most RCWP project contracts began in 1980-81 and ended in 1986, with project results currently being evaluated. The RCWP program will terminate in 1992; however, a few individual projects have been extended until 1995.

The RCWP is administered by the U.S. Department of Agriculture's Agricultural Stabilization and Conservation Service. Based on the principle of interagency cooperation and the existing federal/state/local partnership, the RCWP is also assisted by other federal agencies, including the Soil Conservation Serice, Environmental Protection Agency, Extension Service, Forest Service, Agricultural Research Service, Economic Research Service, and Farmers Home Administration, as well as many state and local agencies.

Both direct water quality benefits and a wealth of experience in agricultural NPS pollution control have resulted from the RCWP. Results and lessons learned from RCWP projects constitute an important source of information for other federal and state NPS pollution control programs. The program has also helped to define reasrch needs and has increased public awareness of this important water quality problem.

The following report constitiutes a 10 year report on one of the 21 RCWP watershed projects. Each 10 year report describes the watershed project undertaken, monitoring conducted, results as of 1991, and recommendations.

These 10 year reports, other project data, and on-site project evaluations will provide the basis for a final summary and evaluation of the entire RCWP to be prepared by the National Water Quality Evaluation Project (NWQEP) by the end of 1992. Finally, some of the projects that have been extended past 1991 may also publish addendum reports.

2.2 PROJECT BACKGROUND

2.2.2 OVERVIEW OF PROJECT

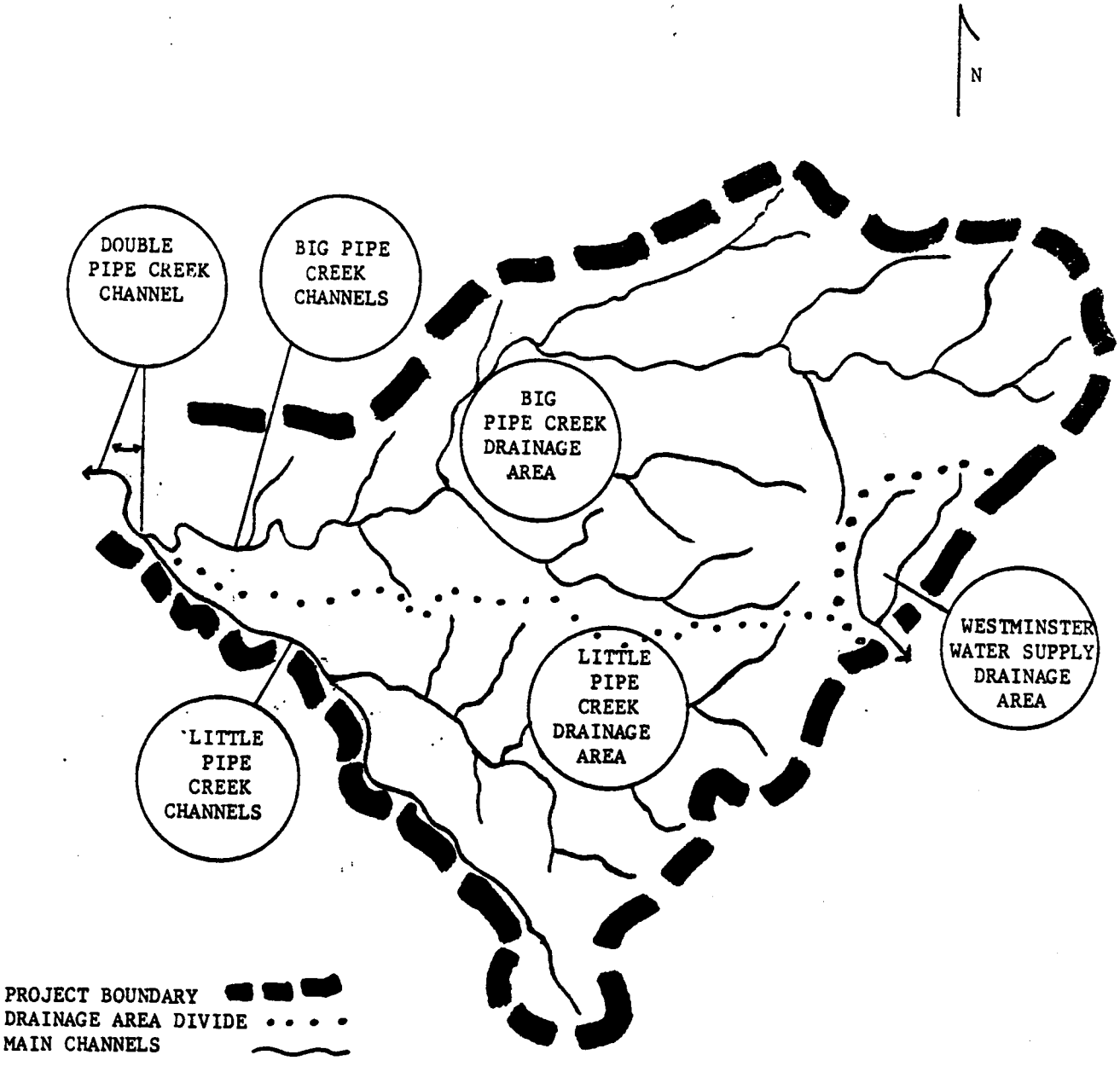
The Double Pipe Creek drainage basin in Carroll County is a part of the multi-county Monocacy River basin that runs from within Pennsylvania down to the Potomac River above Washington D.C.. Farm operations need to include erosion control due to the Piedmont terrain. Known as one of the leading dairy counties within the state, the management of farm nutrients both from livestock wastes and commercial fertilizers is vitally important for good water quality.

The overall goal of this project is to apply the Best Management Practices which will address the most critical water quality problems in the project, specifically, high fecal coliform organisms and potential sediment loads, and be able to show a measurable improvement in the degree of water quality. The existence of high fecal coliform organisms, which are indicators of pathenogenic bacteria in the streams, threatens domestic water supplies, aquatic life and contact recreation due to the potential health hazards involved. Studies have shown that the level of fecal coliform organisms is in excess of the 200 MPN/100 ml, State Standard in Little Pipe Creek and Big Pipe Creek. /1 /2

Monitoring data collected during the late 1970's indicated turbidity levels were consistently in excess of the State Standards. Since sediment is a major contributor to turbidity it was inferred that it was also a water quality problem. Sediment also endangers aquatic life in streams. The impact of pollutants including nutrients, sediment, pesticides and herbicides, oxygen demanding materials and toxins, is well known. /3

Sect. 2.2.2

PROJECT PHYSICAL SETTING



NOT TO SCALE

FIGURE 1

To make this project more cost effective, major emphasis was placed on preventive measures and management of the soil resource which directly affected water quality. Correcting the problems, whether animal waste, sediment or chemical runoff after it has reached a water course was, obviously, much more costly than preventing it.

For example, the concept of diverting fresh water around a livestock area as well as proper handling of the animal wastes inside the facility has been considered in all applicable plans. Preventing the displacement of soil particles in a water course was emphasized over collecting it downstream. In some instances, however, trapping and timely removal of sediment may appear to be the only practical means of contributing to increase water quality. Good management and implementation of BMP's on the areas contributing to farm water quality problems, was thought to be an integral part of all Water Quality Plans approved.

/1 *Maryland Department of the Environment, 1989. Water Quality Assessment of Little Pipe Creek prior to the upgrade of the Westminster Waste Treatment Plant. Water Management Administration/MDE.*

/2 *Versar Inc., 1986. Nonpoint Source Assessment of the Monocacy River with special emphasis in Double Pipe Creek Watershed. Final report for the State of Maryland. O.E.P. D.H.M.H. Baltimore, MD.*

/3 *Carpenter, J.H., D.W. Pritchard, and R.C. Whaley. 1969. Observations of Entrophication and Nutrient Cycles in some Costal Plains. P210-224. In Eutrophication: Causes, Consequences, Correctives. National Academy of Sciences. Washington, D.C.*

2.2.3 POPULATION, CLIMATE, PHYSICAL SETTING

A. POPULATION

See section 2.5.3 for changes in population in the project area during the duration of the project.

B. CLIMATE

The climate for Carroll County is typical for the humid Mid-Atlantic Region. Average annual rainfall is 45 inches and average annual snowfall is 28 inches. The summer rainfall is characterized by high intensity short duration storms, where as winter rainfall is longer in duration and lower intensity. The average annual temperature is 50 degrees F and ranges between 22 degrees F and 88 degrees F. The growing season consists of 175 days. Like other areas of the Piedmont region, the land in Carroll County is frozen part of the year without snow cover.

C. PHYSICAL SETTING

Carroll County is in the North Central part of Maryland. It has a land area of 289,920 acres or 453 square miles (Figure 2). Westminster, the largest town and county seat, is near the center of the county. The county is comprised of rolling hills and lush valleys. The area is in easy commuting distance to Washington D.C. and Baltimore.

Sect. 2.2.3 PROJECT LOCATION

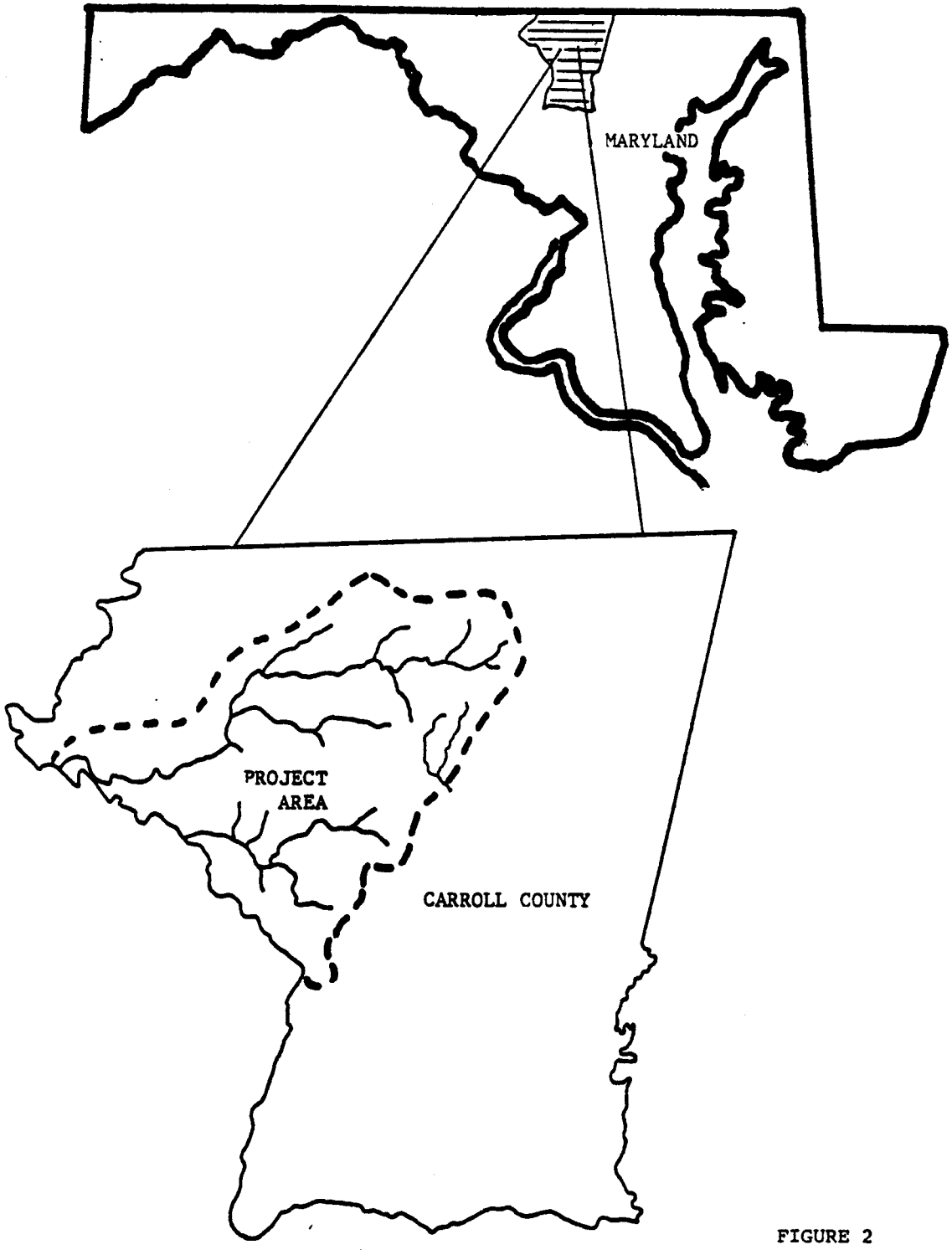


FIGURE 2

PROJECT AREA WITHIN CARROLL COUNTY

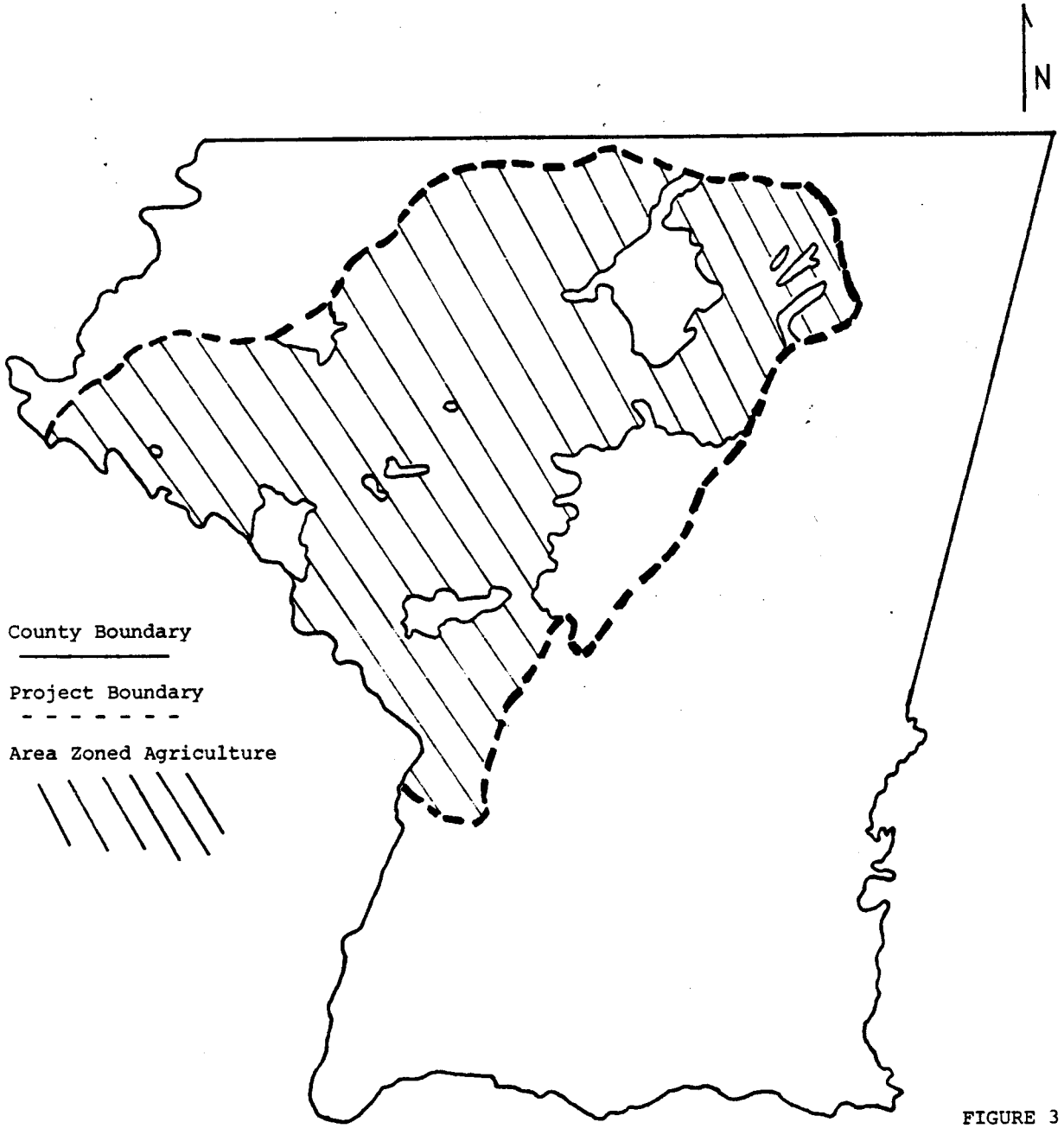


FIGURE 3

2.2.4 LAND USE AND EXISTING AGRICULTURE PRACTICES

A. LAND USE SUMMARY

The project area consists of 112,200 acres. The land use map (Figure 3) shows the current agricultural zoning for the project area. The areas now zoned for agriculture are essentially the same as were zoned agriculture in 1980, the beginning of the project.

Dairy and cash grain have been and still are the predominate types of farming. Some hogs, sheep, beef cattle, horses and poultry (primarily laying hens) are found in the area.

Corn, soybeans, small grain and hay crops were the principal crops. Most of the soybean acreage was planted (by the no-till method) as a double crop following the harvest of the small grain.

Approximately 30% of the corn was planted by the no-till method and 30% is planted by some type of minimum tillage.

A large percentage of the more sloping land was farmed in a stripcropping system with either straight strips or contour stripcropping. Other land was generally farmed on the contour.

	Percent	Acres
Cropland	65%	72,600
Pastureland	12%	13,200
Woodland	15%	16,500
Other	8%	9,900

B. GENERAL SOIL ASSOCIATION TABLE

Soil Association	Average % Slope	Erosion Potential	% Amount In Plan Area
Mt. Airy-Glenelg	8 - 45%	High	60%
Glenelg-Chester	0 - 8	Moderate	5%
Penn-Klinesville			
Abbottstown	0 - 8%	Low	20%
Manor	8 - 25%	High	10%
Other	0 - 45%	High	5%

C. AVERAGE SOIL LOSS PER ACRE BY LAND USE

Soil losses from cropland vary with land use, erodibility of the soil, capability class and slope length. Slope length varies from approximately 400 feet on Class IIe land to 60 feet on Class VIIe land. The great majority of te crops (corn, small grains, sorghum, vegetables and soybeans) are grown on capability classes I-IV land, but some are grown in rotation on Class VI land. The average erosion after consideration of the conservation practices already applied varies from 7.6 to 14.8 tons per acre as shown below.

AVERAGE ANNUAL EROSION RATE COMPUTATION
(Universal Soil Loss Equation Parameters)

Capability Subclass	% of Sub-Class "e" Cropland	USLE - PARAMETERS K	R	/2 C	P	/1 LS	Soil Loss T/AC
II E	52.6	.37	175	.13	.8	1.13	7.6
III E	24.2	.37	175	.12	.6	2.54	11.9
IV E	15.0	.37	175	.10	.6	2.69	10.4
VI E	5.7	.37	175	.05	.8	3.75	9.7
VII E	2.4	.37	175	.05	1.0	4.56	14.8

/1 While the standard average slope for VI E is 20% most cropland is on the low end of the 15% to 25% slope range. Considerable acreage of VI E is severely eroded.

/2 C-values were computed for each subclass by weighing appropriate C-values for cropping systems based on observations within the project area.

P-value was based on the assumption that 33% of the land was farmed in contour strips. Thirty-three percent was untreated but had some cross-slope farming. The remainder was untreated. P-value is the average of the three levels based on conservation practices used. C-values were computed for each subclass by weighing each appropriate C-value for each major rotation or cropping system according to the acreages of different cropping systems.

D. CONSERVATION TILLAGE PRACTICES

Original estimates showed that 30% of the corn and essentially all of the soybeans were no-till planted under a good mulch cover. An additional 30% of the corn was no-till planted in fields without a good mulch cover or in fields prepared by chisel plowing. The no-till percentages for the county were representative of the project area.

Below are estimated percentages of the acres farmed using various tillage methods. This information is extracted from the 1990 National Survey of Conservation Tillage Practices completed by ASCS, SCS, Extension Service and Soil Conservation District of Carroll County. It is estimated that this data is representative of the type of tillage in 1980.

	Conservation Tillage		
	More than 30% Residue		Less Than
Crop	No-Till	Mulch-Till	15% Residue
Corn	28%	33%	39%
Small Grain	16%	46%	38%
Soybeans	53%	27%	20%
Forage Crops	47%	0%	53%

It may be concluded from these estimates that the predominate tillage methods used are those resulting in greater than 30% residue retention.

E. ANIMAL WASTE PRODUCTION

Many of the farmstead and barnyard areas are adjacent to streams and temporary seasonal storage of animal waste was in unconfined storage areas. This resulted in waste materials continually being flushed into the streams by rain water or seep water from ground springs.

Below is an estimate of animal waste production in the project area in 1980.

Animal Waste Production

Types	Number of Animals	Waste Production Per Year
Dairy	19,774	306,744 tons
Beef	6,958	78,729 tons
Swine	6,222	56,775 tons
Poultry	1,000,000	9,672 tons
Horses	7,747	15,941 tons

At the beginning of the project it was estimated that fewer than a dozen adequate animal waste storage facilities existed in the project area.

2.2.5 PROJECT JUSTIFICATION

The following information has been extracted from the original Double Pipe Creek Rural Clean Water Project Application.

"In a report prepared under Authority of Section 208 of the Federal Water Pollution Control Act of 1972, titled "208 Water Quality Management Plan for the Middle Potomac River Basin" it stated "The major problems in this area are sediment loads and fecal contamination." It further state that "Agriculture potentially represents 65% of non-point source pollution".

"Further studies show that an acre of cropland is losing 7 tons of soil per acre, per year (average tolerable is 3 tons of soil per acre, per year), and that the Double Pipe Creek Watershed ranks highest in the state with potential animal waste problems. Measured in manure equivalents, there are approximately 21,000 manure equivalents in this area. A manure equivalent is defined as: That amount of manure produce by any class of livestock or wildlife which equals the amount of manure produced by the average dairy cow (using 1,000 pounds per cow)."

Livestock within the project area includes dairy cows, hogs, horses, sheep, beef cattle and poultry. The State Soil Conservation Committee had recently selected the following state-wide sediment and animal waste potential critical areas and categorized them by beginning with the area that has the most potential for water quality problems. Double Pipe Creek was first on the list.

Records had shown (in 1979) that water quality had been deteriorating since sampling collection began in 1966.

Information contained in the "Erosion and sediment survey of the Baltimore Regional Planning Council area" dated December 1977, showed that the redirection of sediment delivery to the streams from sheet and rill erosion would be 46% when good conservation and management practices were used. The sheet and rill erosion under existing conditions in 1979 was estimated to equal 77,513 tons of sediment delivered to the stream system per year.

It was estimated that the actual number of people benefiting from the project would be those persons in the project area (32,000) plus users of water from the Monocacy River, Potomac River (water supply for Washington D.C.) and Westminster (Carroll County).

In general, it was felt that the long term benefits from the application of the BMP's would be greater than the actual cost of the BMP's.

2.3 PROJECT GOALS AND OBJECTIVES

2.3.1 FINDINGS AND RECOMMENDATIONS

* Water quality goals were not set at attainable levels and should have been goals that could have been achieved.

* The setting of the goal for number of contracts was very difficult since it was not known how many and the extent of BMP's that would be involved with each contract.

  It is recommended that future projects center on goals for BMP's and ultimately getting all the BMP's established for each farming operation that are needed for a good water quality system.

* More time should have been provided to assess needs and establish goals during development of the application.

* For projects of this type, where special results are desired, the management staff from the National level, State level and Local level needs to insure that adequate staffing is available to carry out the "special project" without negatively impacting the ongoing local Soil Conservation District program.

* I & E Goals - More coordination and interaction between other project I & E personnel.

* For monitoring goals, the pre-implementation water quality characterization was difficult to attain.

2.3.2 WATER QUALITY GOALS AND OBJECTIVES

A. FINAL

The water quality goals did not change throughout the 10 year period. Erosion control, sediment reduction and the reduction of animal waste contamination of the streams have continued to be the water quality goals.

B. INITIAL

The water quality goals for erosion and sediment reduction were to reduce the sediment delivery to the streams by approximately 36,000 tons per year.

The specific water quality goals of the Double Pipe Creek Rural Clean Water Project were to reduce the level of fecal coliform bacteria instream for turbidity instream (150 units or a monthly average of 50 units) at all times. The more general goal of the project was to reduce the agriculturally generated pollutant load in the watershed, particularly the nutrient contribution.

The project plan did not establish a quantity goal for reduction of animal waste contaminants to the streams but rather stated "The construction of animal waste management systems and timely application of animal manure will reduce nutrient loading to the water supply reservoirs and streams.

Fecal coliform levels can be reduced to a reasonable level, improving the water quality substantially. Animal waste systems will be designed to store animal waste for extended periods providing for timely application to the soil."

2.3.3. IMPLEMENTATION GOALS AND OBJECTIVES

The primary objective of the project has been to improve the water quality, both in the drainage basin within Carroll County and downstream. Major emphasis was to manage livestock waste rather than concentrate on sediment reduction.

To accomplish the above, the goal was to have an acreage equal to 50% of the critical area under contract by the end of the third year. The actual planning process was spread over the initial five year period.

The schedule for implementing the plan was to have the majority of the BMP's installed within the first ten years of the project. It was expected that a small percentage of BMP implementation would extend into the period of 1990-1995.

Technical assistance planned for the project was 1 Engineer, 1 Soil Conservationist, 2 Soil Conservation Technicians and 1 Secretary, part-time.

The selected BMP's for the project as shown in the 1980 Plan of Work were:

Cropland Protective Cover
Conservation Tillage System (No Cost Sharing)
Diversion
Grassed Waterway or Outlet
Stream Protection
Sediment Retention Structures
Grazing Land Protection (Livestock watering facility from ponds and springs)
Stripcropping (Contour and Field)
Waste Management System
Permanent Vegetative Cover on Critical Areas

As the project proceeded through the 1980's, some adjustments to the original goals were made. These adjustments were brought to the attention and approved by the Local Coordinating Committee and the local ASCS County Committee.

These adjustments were:

1. Initially the monitoring for the project was to be carried out through an agreement between the Maryland Water Resources Administration (WRA) and the state office of the Soil Conservation Service or the RCWP State Coordinating Committee.

   Before the project really got under way, the state agencies underwent some reorganization and the monitoring was carried out under the supervision of the Maryland Department of the Environment (MDE) working with a financial grant from Region 3 EPA. MDE contracted for the monitoring through a private firm who submitted a monthly and a final report to MDE.

2. In 1985, the National, State and Local Coordinating Committees met in the project area and discussed the project. Three important changes came about as a result of the meeting.

   A. Two BMP's -- Fertilizer Management BMP-15 and Pesticide Management BMP-16 could be included as BMP's to existing contracts by the existing participants requesting modifications.

   B. BMP-15 and BMP-16 (shown above) would be mandatory for any future contracts.

   C. Since the landowners within the project area showed continued interest in signing new contracts, the contract period was extended to December 31, 1986.

   The goal of the project remained consistent throughout the 10 years, "water quality improvement, primarily through BMP's, enabling farmers to manage animal wastes."

2.3.4. INFORMATION AND EDUCATION GOALS AND OBJECTIVES

A. FINAL

There were basically no major variations in the goals and objectives of the I & E Subcommittee during the course of the project.

B. INITIAL

The initial goals and objectives of the Information and Education program were divided into two categories. The first was the awareness

stage where the committee wanted to inform the general public and the farming community as to the goals of the project and how the project would be administered and funded, plus the impact it would have on water quality.

The second phase of the Information and Education goal, which continued throughout the sign-up period, was to encourage farmer and landowner participation. Following is a summary of the Information and Education plan of action to accomplish this phase.

1. Press Conference to announce the approval of the Double Pipe Creek project.

2. Informational flyer to describe the general outline of the project.

3. Three community information meetings at different locations within the Double Pipe Creek area were to be held to discuss the project and to answer questions for both the farm community and the general public.

4. Newsletters and news releases were to be written, encouraging farmers to sign up for the project and to describe the BMP's that could be placed on the farm to help meet the water and soil conservation goals.

5. To develop informational and media material that could be used to localize the project to Carroll County and Maryland, to inform the project area farmers of the program and to inform the general public of the importance of improving water quality. This would include the following items:

   A. Slide tape series on Carroll County RCWP and BMP components of the project.
   B. Stationary for the Local Coordinating Committee (LCC) with a Double Pipe Creek logo.
   C. Booklet - WATER "The Basics of Life" to be purchase for distribution to county school children to accompany RCWP literature.
   D. Folders to be developed with RCWP informational literature that would be handed out by all county agencies -- ASCS, SCS, SCD, CES.
   E. SCS Technicians would develop an album of sample BMP's that could be used to show participants what the practices entailed.

F. Plan and conduct tours of completed BMP installations encouraging non-participating farmers to enroll in the project.
G. Schedule a Farm Visitation Day where farmers could visit a number of farms in the watershed and talk with project participants.
H. To develop displays explaining the project for exhibit at the county 4-H Fair and other large gatherings of the farm community and the general public.

C. ADJUSTMENTS AND REFINEMENTS

The initial goal of the Information and Education subcommittee was to meet semi-annually to plan the various Information and Education projects and to evaluate work accomplished to date. This schedule was adhered to the first five years. After the sign-up period had lapsed, the committee met annually, but usually only the agency people attended.

Additional educational activities and promotions were added over the course of the first six years of the project. These included recognition of farms that had completed at least one BMP; the farmers were presented metal signs signifying that they were a "RCWP Cooperating Farm". During a particularly slack period in sign-ups, a meeting was arranged with contractors who constructed BMP's to inform them of the project in hope that they could help stimulate interest. Near the end of the sign-up period a list of farms that had been targeted as a priority, but had not shown any interest was developed. These targeted individual farmers were visited by either SCS, ASCS, CES, or SCD personnel. In addition, Vo-Ag teachers in the high schools were kept informed about the RCWP project and encouraged to discuss the project with their classes.

All adjustments to the original Informational and Educational goals were made near the end of the sign-up period in the hope of increasing participation.

2.3.5 ECONOMIC EVALUATION GOALS AND OBJECTIVES

Since this project was not targeted to consider the economics associated with the BMP's, no economic evaluation was planned at the inception of the project.

2.3.6 WATER QUALITY MONITORING GOALS AND OBJECTIVES

The goals of the water quality monitoring program being conducted to support the Double Pipe Creek RCWP are to:

1. Detect long term trends in pollutant loads and water quality, and measure the effectiveness of the BMP's.

2. Determine the projects' impacts on turbidity levels and fecal coliform levels in Big Pipe Creek.

2.4 PROJECT DEVELOPMENT

2.4.1 HIGHLIGHTS OF PROJECT DEVELOPMENT

A. PROJECT EXPANSION

As noted in Section 2.4.2, Summary of Annual Achievements, the project had two main elements of expansion:

1. BMP-15 and BMP-16 were added in 1985. This addition resulted in the hiring of an CES extension agent to carry out these practices.

2. The addition of the above practices required an extension of the sign up period for another year and a half. This sign-up extension allowed new producers to enroll in the program and those with approved contracts to add the new BMP's.

B. INSTITUTIONAL COOPERATION

Much of the success of the Double Pipe Creek project can be credited to the cooperation of the agencies involved at the local level. The Carroll County ASCS, SCS/SCD and Extension Service all worked very well together and through these combined efforts were able to obtain their goals. The LCC feels that the local flavor of the project made it more popular with the farmers and greatly enhanced the success of the project.

2.4.2 SUMMARY OF ANNUAL ACHIEVEMENTS

Below is a summary of the events that occurred during the past decade with the Double Pipe Creek project. This list is not all inclusive, but highlights some major events. The information below was extracted from the LCC minutes over the last 10 years.

1979 - Proposal for Double Pipe Creek project submitted.

1980 - Proposal approved for Double Pipe Creek project.
LCC determined that "any farm in the project area having a critical impact on water quality regardless of the distance to streams, will be considered a high priority request."

Cost Share Earned - $8,953.00
Contracts Approved - 5

1981 - Cost Share Earned - $176,518
Contracts Approved - 25

1982 - Cost Share Earned - $283,642
Contracts Approved - 25

1983 - Versar, Inc. completed base line data, stage I of monitoring.
Cost Share Earned - $316,515
Contracts Approved - 18

1984 - Signs given to participants completing BMP's.
- Critical area definition was questioned by the National Coordinating Committee (NCC).
- Law was passed requiring that a conservation plan to accompany Easement Rights bid in order to enter Maryland Ag Land Preservation Program.
- State agreed to continue monitoring when Versar contract expired.
- Demonstration Day held (85 people in attendance).

Cost Share Earned - $187,815
Contracts Approved - 21

1985 - BMP-15 and BMP-16 added to the project.
- Contracting period extended through December 31, 1986.

- Cost Share Earned - $502,836.
- Contracts Approved - 19

1986 - CES Extension Agent hired to write nutrient management plans and to carry out BMP-15 and BMP-16.

- Cost Share Earned - $382,125
- Contracts Approved -

1987 - Cost Share Earned $489,773

1988 - Lease Brothers special approval for a contract in hopes of monitoring on their farm will benefit the project.
- Best Management Progress Tour - to demonstrate progress and practices completed (150 participants - farmers, agency personnel and others).

- Cost Share Earned - $236,014
- Contracts Approved - 1

1989 - Cost Share Earned - $168,033

1990 - Cost Share Earned - $136,464

2.5 CHANGES IN LAND USE PATTERNS AND WATER RESOURCE MANAGEMENT THROUGHOUT PROJECT PERIOD.

2.5.1. IMPACTS AND EFFECTS OF FEDERAL PROGRAMS

Over the ten year period 1980 - 1990, several federal programs have been implemented. Some are still in existence and others have come and gone. Below are listed some of the programs having large enough participation to have some effect on the project area.

A. MARYLAND AGRICULTURAL LAND PRESERVATION PROGRAM

In order for a farm to be accepted in the Maryland Agricultural Land Preservation Foundation, a conservation plan must be developed when easement rights are sold. Since 1980, 21,473 acres have been accepted into the Maryland Agriculture Land Preservation Program in the Double Pipe Creek project area. Between enrolling in the Ag Land Preservation Program and making a financial commitment to water quality through RCWP, many farmers have become committed to remaining in farming.

B. FOOD SECURITY ACT OF 1985

Preliminary information indicates that approximately 75% of the land in Carroll County is highly erodible using the 1985 Food Security Act criteria. The Soil Conservation Service's District Conservationist, estimated that 25% of the cropland acreage will need cropping system modification or the establishment of additional conservation measures to bring the soil loss each year within the established acceptable level.

The changes noted above should have a positive affect on the water quality of the project area including the reduction of soil particles, animal waste and commercial fertilizer nutrients and pesticides in the waters.

C. WHEAT AND FEED GRAIN PROGRAM

Since 1986, the 1985 Food and Security Act Wheat and Feed Grain Program has become a major influence in the project area. Each year enrollment has fluctuated due to changing markets, prices and producer needs. The average county enrollment has been 200 farms, approximately 140 are in the project area. Approximately 4,200 acres has been designated as Acreage Conservation Reserve (ACR). Farm operators in a timely manner, must use needed control measures for erosion, insects and weeds on their ACR land. In general, the land used as ACR is on hillsides or other areas where erosion control is important. The Wheat and Feed program through ACR is resulting in decreased erosion and is preventing animal waste and pollutants from reaching streams in the RCWP area.

D. CONSERVATION RESERVE PROGRAM

Carroll County has limited participation in the Conservation Reserve Program due to high land values and investment opportunities. Although there is not a large participation in this program, 75% of the land enrolled in the county (approximately 700 acres) is in the project area.

E. DAIRY SITUATION

With the dairy industry being the most prevalent type of farming in the county, it is appropriate to note changes in dairy statistics. The decade of the 1980's has seen a 33% reduction in the number of dairy producers in the county. Below is a chart which indicates the dairy situation in Carroll County from 1980 to 1990. Although there are county wide statistics, a vast majority of the dairy farms are in the project area.

CARROLL COUNTY DAIRY SUMMARY 1980 - 1990 /1

Year	Cow Numbers	Milk Produced (1,000 lbs.)	Number Of Producers/2	Wholesale Milk Dollars Per CWT /3
1980	17,700	252,200	293	13.60
1981	18,000	259,800	289	14.30
1982	18,100	262,000	284	14.00
1983	18,800	262,800	266	14.00
1984	19,500	252,200	247	14.00
1985	19,800	271,000	238	13.10
1986	20,000	262,900	222	12.90
1987	17,500	249,300	215	13.10
1988	13,500	240,000	215	13.00
1989	12,900	235,000	197	14.50
1990	12,900/4	241,900/4	192	14.90

2.5.2 IMPACT AND EFFECT OF CROPPING AND CHEMICAL USE CHANGES

During the decade of the 80's, cropping and chemical use changed in Carroll County. During the '70's grain producers and livestock farms relied more on the continuous no-tillage planting of corn. With No-till there was more reliance on soil insecticides to control corn insects. During the 1980's, through educational programs of the CES, an effort was made to use cultural practices and Integrated Pest Management techniques to reduce chemical inputs and to reduce costs of production. In addition, soybean acreage

/1 SOURCE: *MARYLAND AGRICULTURAL STATISTICS SUMMARIES FROM 1979 - 1989.*

/2 SOURCE: *FEDERAL MILK MARKET ADMINISTRATOR, MIDDLE ATLANTIC MILK MARKETING AREA. ALL FIGURES ARE FOR THE DECEMBER REPORTING PERIOD.*

/3 SOURCE: *AVERAGE PRICE, F.O.B. PLANT OR RECEIVING STATION.*

/4 SOURCE: *ESTIMATES.*

increased in the county from 2,800 acres in 1980 to 14,600 acres in 1989. This allowed livestock and grain producers to develop a better crop rotational program which helped to reduce purchased nitrogen costs in corn through the carry-over nitrogen supplied from the previous soybean crop.

During the 1980's the county experienced three major drought years. This imposed a tremendous economic burden on farmers which resulted in them seeking ways to decrease input cost of chemicals and fertilizer. According to the Maryland Department of Agriculture, agriculture pesticide use declined by 2,016,060 lbs. or 19% in Maryland from 1985 to 1989. This data for the state is indicative of the conditions which occurred in the project area.

2.5.3 REVIEW OF CHANGES IN POPULATION, CONSTRUCTION AND OTHER FACTORS

The rapid increase in resident population of the county has resulted in increased construction in the area. Below is an estimate of the population of the Double Pipe Creek project area.

*1980	42,891
1985	48,139
1990	56,531

* Carroll County Department of Planning, January 8, 1991.

Building permits have increased in a proportional manner. The number of Use and Occupancy permits issued is not available before 1987. For the years 1987 - 1990, 2,358 Use and Occupancy permits were issued in the project area. These permits are a good measure of new residences built during the time period mentioned. We have no information on other construction in the area. It can be assumed that support services increased in a similar manner over the three year period and that these support services required comparable construction.

2.5.4 IMPACTS AND EFFECTS OF RCWP

1. Water Quality - the section on monitoring will describe the positive effects the project had on water quality.

2. Farmer Acceptance - the project has been widely accepted by the farm community. This acceptance has had a positive affect on participation of conservation programs in the region. It has greatly increased the credibility of the agencies involved. Most farmers now recognize that they should do their part to protect the environment. The project has brought this to their attention.

3. Conservation Demonstration - the $50,000 cost share payment limit has allowed the producer to construct practices that may not have been economically feasible without it. After construction and use, most farmers have been able to see the impact of the installed BMP's. Through direct contact and tours, other farmers have become interested in similar practices. The project has served as an effective model of practices that can be installed to improve water quality.

4. Other Special Projects - After viewing the success of the Double Pipe Creek Project, State and Federal officials have been eager to approve targeted conservation projects in other parts of the county and region. For example, in 1989, Carroll County ASCS was selected for a Special Water Quality Project in the Piney/Alloway Creek Watershed, which is adjacent to Double Pipe Creek. The State of Maryland then approved the Piney/Alloway Creeks area as a Special Targeted Watershed Project. In 1990, The Piney/Alloway Creek Watershed was selected as a targeted sub-watershed of the Monocacy River Watershed Water Quality Demonstration Project. These programs in Carroll County further emphasize the ability of the public agencies to serve the farmers conservation needs.

5. Economy - The project has enhanced the economy of the region in three significant ways:

   A. Created Work for Conservation Contractors.

      Many contractors were able to hire additional personnel to work strictly with the Rural Clean Water Projects. The cost share money made local jobs more available

B. Area Merchants Benefit.

Under the Rural Clean Water Project, nearly 300,000 feet of grassed waterways and 100 animal waste facilities have been installed. This has provided an infusion of money into the local economy through the purchase of needed materials.

C. Additional Benefits.

The farmers in the area were able to install water quality improvement practices that a farm income would not have allowed in the past.

6. Public Awareness - Through activities that have been conducted throughout the Double Pipe Creek Project, the public has become aware that the farming community is doing their part to protect the environment.

3.0 IMPLEMENTATION RESULTS

3.1 FINDINGS AND RECOMMENDATIONS

* Implementation is correlated to farm income and farm income is difficult to project over a 10-15 year program period.

* Weather cycles also affect farm income. During the project, the project area experienced three serious droughts.

* Availability of contractors with the experience, equipment and ability was not a problem.

* Through the experimental nature of the project, a wide range of innovative options were planned and installed, particularly through the BMP #2.

* More personnel were needed to work with landowners and operators concerning the management and maintenance of installed BMP's.

* The flexibility to try new ideas during practice application and the $50,000 payment limitation was a great asset.

* The administration of the project by ASCS was a great advantage since they already had the experience for administering cost sharing programs.

3.2 CRITICAL AREA TREATMENT

3.2.1 DEFINITION OF CRITICAL AREA

1. Following is the initial procedure for identifying critical areas on individual farms and establishing the order of BMP installation developed in 1980.

   A. First Priority Critical Areas

      Livestock farms where the source of pollution (concentrated dairy, beef, poultry or swine) is within 200 feet of a stream (perennial or intermittent) or within a drainage course near a stream.

   B. Second Priority Critical Areas

      Livestock farms where the critical source of pollution is more than 200 feet from a stream or watercourse. Cropping areas where erosion conditions are delivering sediments to the stream systems.

   C. Third Priority Critical Areas

      Areas from which a water quality problem does not originate but the carrying out of one or more best management practices would result in improved water quality by trapping pollutants that are originating on another property.

NOTE: Applies to all - A, B, C.

The following general criteria will be used in establishing the priority for BMP installation:

1. Type and extent of livestock operation
   a. Dairy, Beef, Poultry, Swine
   b. Confinement operation vs. grazing program
   c. Animal concentrations

2. Type of cropping system
   a. Conventional vs. No-till
   b. Row crops vs. forages

3. Land resource conditions
   a. Soil type
   b. Slope factors

4. Proximity to streams
   a. Measured distances to sources of pollution

5. Off-site vs. On-site benefits

6. Management techniques currently used (livestock or crops)

2. The primary area criteria for Critical Area Designation during project formulation was that the farmstead, with a livestock pollution potential, be within 200 feet of a stream. As the project moved forward (Figure 4), the LCC criteria changed to reflect the situation where livestock herds, not within 200 feet of the stream were important and that all the lands of the farm should be considered critical since the animal wastes were being applied to the farm.

   The first priority critical area then became farms where livestock and the waste management situation presented a water quality problem and where severe gully erosion existed.

   The second priority critical area became farms with primarily erosion control problems, due to sheet and rill erosion.

3.2.2. ACCOMPLISHMENTS

BMP's installed during the ten year period were as follows:

BMP #1	- Permanent Vegetative Cover	252 ac.
BMP #2	- Animal Waste Control Facilities	100 no.
BMP #3	- Stripcropping Systems	2,031 ac.
BMP #5	- Diversions	12,287 ft.
BMP #6	- Grazing Land Protection	84 no.
BMP #7	- Waterway Systems	213,148 ft.
BMP #8	- Cropland/Protective Cover	0 ac.
BMP #10	- Stream Protection System	22 no.
BMP #11	- Permanent Vegetative Cover on Critical Areas	14 ac.
BMP #12	- Sediment Retention, Erosion or Water Control Structures	0 no.
BMP #15	- Fertilizer Management	26 Contracts
BMP #16	- Pesticide Management	28 Contracts

LOCATION OF RCWP CONTRACTS IN PROJECT AREA (BY CONTRACT NUMBER)

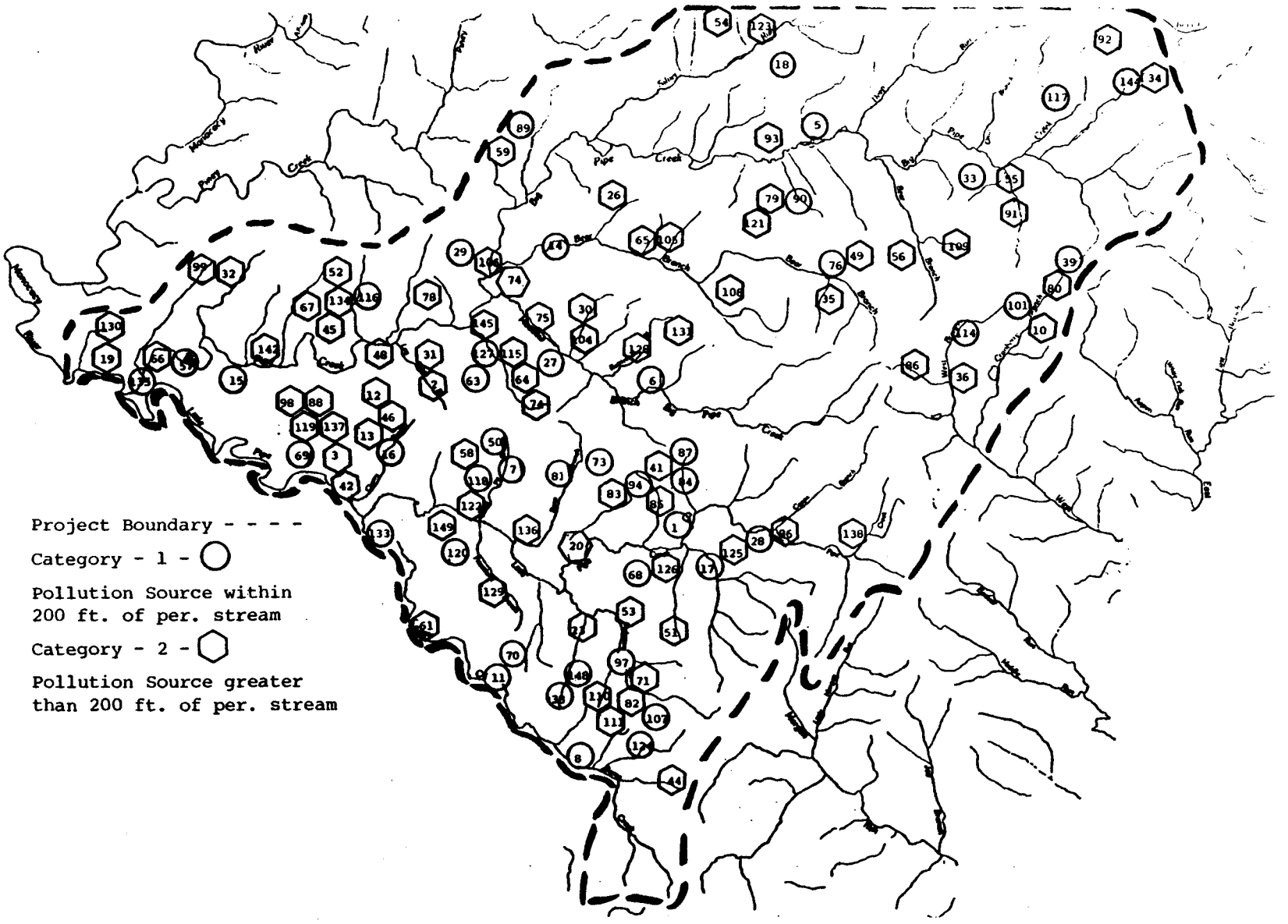


FIGURE 4

Some of the BMP-2 facilities were the result of more than one component, shown on more than one ASCS referral (form AD-862). Each ASCS referral is tabulated as a separate BMP. A facility, as shown above, may consist of an animal waste storage area, a pump, and solids separation facility. The installation of these three components may have generated one, two or three ASCS referrals. Together they make up a facility to solve a single problem.

The footage shown for BMP-7 is the footage that was established on the ground. Additional individual AD-862's (ASCS referrals for work to be done) were sometimes issued for repair work that was the same footage which had been completed for the original AD-862.

Six of the fourteen acres shown as Permanent Vegetative Cover on Critical Areas were actually done as a BMP-2 practice, but were done for both erosion control and animal waste run-off filtering.

3.3 BMP IMPLEMENTATION

3.3.1 DESCRIPTION OF EACH BMP AND THE PROBLEMS THEY ADDRESS

1. BMP-1 Permanent Vegetative Cover

   This practice consists of the establishment of a grass or grass and legume mixture on farmland with excessive water runoff or soil loss which constitutes a water quality problem. The vegetation must be maintained for at least 5 years. The problem addressed would normally be excessive erosion of the soil or high rates of movement of animal waste from the land after animal wastes are applied to the field.

2. BMP-2 ANIMAL WASTE CONTROL FACILITIES

   The facilities installed were normally animal waste storage settling (separation), or filtering areas. They consisted of concrete, metal, treated wood, or earthen construction. Some were designed and constructed by private companies with installation supervised by the local Soil Conservation District office staff. Others were individually designed with construction supervised by the local District office staff. All were individually planned to meet specific farm needs.

3. BMP-3 STRIPCROPPING SYSTEMS

This practice consisted of the planting of crops in narrow fields, generally 80 feet to 120 feet wide, as near as practical on the contour or across the slope. The type of crops in the fields were planted so that no two adjoining fields would be in a row crop at the same time unless one of the crops were double cropped into a small grain stubble. Some of the stripcropping fields were on the contour curving around sloping areas. Others were generally straight fields running across a slope. The problems addressed by the stripcropping practice were excessive soil erosion and high runoff carrying both soil and nutrients.

4. BMP-5 DIVERSIONS

Diversions consist of channel and earthen berm combinations, constructed across the slope of a field that will intercept and carry runoff water from the area above, and channel it to a safe desirable outlet. The diversions were used to reduce or eliminate erosion and to prevent runoff water flowing onto or across a livestock concentration area or an animal waste storage area.

5. BMP-6 GRAZING LAND PROTECTION

The practice consisted of installing livestock drinking facilities in pastures to provide for a clean water supply for the livestock on areas away from the farmstead. The problem addressed degradation of stream water because the livestock needed to go into the stream for their water.

6. BMP-7 WATERWAY SYSTEMS

The waterways consist of earthen depressions or swales built in concentrated flow areas of fields and established in permanent sod to safely convey water. The waterways prevent soil erosion, general gully erosion and function as living grass filter of silt, nutrients, and chemicals.

7. BMP-8 CROPLAND PROTECTIVE COVER

This practice consists of the planting of a temporary vegetative crop after fall harvest, when the preceding crop does not result in adequate plant residue remaining on the soil surface. The temporary crop is usually a small grain such as barley or rye and provides soil cover until the following spring planting.

8. BMP-9 CONSERVATION TILLAGE SYSTEMS

Conservation tillage encompasses the various methods of planting crops using minimum soil tillage. Generally, in the project area, conservation tillage meant:

No-till: Planting in good soil cover with a no-till crop planter that only disturbs the soil and soil cover in the row line where the seed is being placed.

Minimum Tillage: Either chisel plowing with light disking before planting or only heavy disking to prepare the soil for planting.

This practice helps to prevent sheet and rill erosion, and reduces water and nutrient runoff. Non cost-shared BMP.

9. BMP-10 STREAM PROTECTION SYSTEM

Both stream crossing facilities and vegetative filter areas were used to carry out this practice. Stream crossings were provided for livestock by installing pipes with earth fill and stone protection. Vegetative areas were established adjacent to watercourses near concentrated cattle holding or exercise lots where the runoff water would have direct access to the stream or waterway. The primary problem addressed by this practice was water quality degradation.

10. BMP-11 PERMANENT VEGETATIVE COVER ON CRITICAL AREAS

Small and frequently re-occurring problems were corrected with the used of this practice in contrast to the field type protection of BMP-1 Permanent Vegetative Cover. These areas were generally watercourses in a field where the area

could be stabilized by the farmer doing general shaping with farm equipment and seeding into a permanent grass cover. The problems corrected were usually small gullies that would re-occur but the quantity of runoff did not justify the need for large constructed grass waterways built as BMP-7. Soil erosion was the primary problem corrected by this practice.

11. BMP-12 SEDIMENT RETENTION, EROSION OR WATER CONTROL STRUCTURES

Two types of facilities were installed through this practice. Rock structures with pipes were installed to control flow on a watercourse. Earthen embankments with pipe outlets designed to temporarily store and slow release runoff water, were used to control storm flow above cattle holding areas and animal waste storage facilities. These practices both reduce erosion problems and helped prevent nutrients from being carried into the stream system.

12. BMP-15 FERTILIZER MANAGEMENT

The testing of both soils and animal wastes, enabled the Nutrient Management Specialist to develop a nutrient management plan with the farmer in conjunction of BMP-2. The practice primarily addressed the nutrient runoff problem.

13. BMP-16 PESTICIDE MANAGEMENT

The "Scouting Program - Intergrated Pest Management (IPM)" managed by the Carroll County Pest Management Association (CCPMA) with the support of the CES was the primary vehicle used to carry out this practice. Scouts were hired by CCPMA and trained by the CES to go onto participating farms monitoring the field crops for the presence of farm pests. The scouts then prepare reports that the farmer uses to decide when it is economically feasible to control the pests. The need for reducing chemicals in the stream waters was the primary objective of this practice. The goal of the BMP was to reduce the potential for pesticide runoff.

3.3.2 ACRES SERVED BY EACH BMP & BMP UNITS INSTALLED

During the period 1980-1990, Best Management Practices were installed as a result of 124 contracts. Three BMP's -- Animal Waste Control System (BMP-2), Grazing Land Protection (BMP-6), and Grass Waterways (BMP-7) were the primary practices installed. These three practices accounted for 94% of the cost share monies used to date for BMP application and were the practices that were completed in the majority of the contracts. The other BMP's were completed in 20% or fewer of the contracts. Sixty percent (60%) of the landowners with active contracts have completed an Animal Waste Control System practice, 44% have installed a Grazing Land Protection practice, and 74% have installed one or more Grass Waterway practices.

The Animal Waste Control System practices were installed fairly evenly throughout 1981 to 1988 with two peak years of 1985 and 1987. The first year accounted for only 3% since approval for obligating funds did not arrive until near the middle of the year. The years 1989 and 1990 have shown a low level of installations since most of the contracts called for the installation of the animal waste management practices early in the plan implementation stage.

The installation of the Grazing Land Protection practice reached a high level in 1983, '85, '86 and '87.

Grass Waterway practice installation showed a normal curve with a gradual increase from 1981 to 1985 when the installation peaked then decreased to a low level in 1988 through 1990.

1984 showed a low level of installation for all three principal practices.

The following charts and graphs show the project work completed. Figure 5 shows the work completed using figures from the Agriculture Stabilization and Conservation Service (ASCS) office where each referral has been counted as a separate practice item and referrals for repairs have been counted as additional work done.

Figure 6 shows a summary of funds paid to farmers for BMP's installed by practice by year.

PROJECT WORK COMPLETED
BY UNIT

BMP	UNIT	CUMLATIVE WORK COMPLETED	WORK COMPLETED 1980	WORK COMPLETED 1981	WORK COMPLETED 1982	WORK COMPLETED 1983	WORK COMPLETED 1984	WORK COMPLETED 1985	WORK COMPLETED 1986	WORK COMPLETED 1987	WORK COMPLETED 1988	WORK COMPLETED 1989	WORK COMPLETED 1990
1	AC	206.1						67		60	52.8	11.4	14.9
2	NO	203	1	15	18	20	21	25	26	36	24	9	8
3	AC	2111.1				380	215	328.1	497	1	179.6	368.4	142
5	FT	5946			450	625	856	575	1848		1200	92	300
6	NO	110			9	16	11	17	16	19	9	4	9
7	FT	221616	600	6650	10798	24435	16715	62824	27552	42098	12423	7565	9956
10	NO	18			1			3	2	3	4	2	3
11	AC	16.3				1.5	1	4	6.5	3		.3	
12	NO	10					2	4	1	3			
15	AC	9390								200	2086	4908	2196
16	AC	4881.5								922	991	2503.5	465

FIGURE 5

PROJECT WORK COMPLETED
BY COST SHARE

BMP	UNIT	CUMULATIVE WORK COMPLETED	WORK COMPLETED 1980	WORK COMPLETED 1981	WORK COMPLETED 1982	WORK COMPLETED 1983	WORK COMPLETED 1984	WORK COMPLETED 1985	WORK COMPLETED 1986	WORK COMPLETED 1987	WORK COMPLETED 1988	WORK COMPLETE 1989	WORK COMPLETED 1990
1	AC	$ 37,150						3333		26491	4449	1335	1542
2	NO	1466,101	8953	158391	241363	180850	117661	232206	19061	226686	150752	108459	21719
3	AC	27,302				1931	4053	4119	4431	1496	2695	6093	2484
5	AC	15,817			1039	759	1906	724	4015		5507	629	1238
6	NO	231,045			14783	28797	23084	37665	33722	40182	19433	6137	27242
7	FT	829,928	5335	42329	23782	49963	41385	213715	133649	172999	41156	30955	74660
10	NO	34,007			1417			1779	6978	8327	7927	3433	4146
11	AC	4,114				659	56	1663	820	744		172	
12	NO	13,430					205	3950	449	8826			
15	AC	6876								150	2075	2704	1947
16	AC	14,596								2943	3012	7155	1486
TOTAL		$2680,366	$14,288	$200,720	$282,384	$262,959	$188,350	$499,154	$203,125	$488,844	$237,006	$167,072	$136,464

FIGURE 6

Figures 7 through 10, show the BMP's installed where individual items installed combine to produce a facility are counted as one BMP (facility) and repairs done under additional referrals have not been counted as additional BMP's installed.

Attachment No. 1 at the end of the report, shows a general summary of BMP's installed by Contract Number.

3.3.3 NUMBER AND PROPORTION OF PROJECT AREA PRODUCERS IMPLEMENTING EACH BMP

RCWP - 10 year

Of the 124 contracts, the number of contracts performing each BMP was:

BMP # 1 = 10 = 8%	BMP # 7 = 92 = 74%
BMP # 2 = 74 = 60%	BMP # 8 = 0 = 0%
BMP # 3 = 25 = 20%	BMP #10 = 16 = 13%
BMP # 5 = 23 = 19%	BMP #11 = 12 = 10%
BMP # 6 = 55 = 44%	BMP #12 = 4 = 3%

SPRING DEVELOPMENTS - BMP-6 -- 1980 THROUGH 1990:

1980 - 0 = 0%	1986 - 14 = 17%
1981 - 1 = 1%	1987 - 10 = 12%
1982 - 4 = 5%	1988 - 4 = 5%
1983 - 18 = 21%	1989 - 6 = 7%
1984 - 4 = 5%	1990 - 3 = 3%
1985 - 20 = 24%	

ANIMAL WASTE BY YEAR - BMP-2 -- 1980 THROUGH 1990

1980 - 3 = 3%	1986 - 11 = 11%
1981 - 11 = 11%	1987 - 15 = 15%
1982 - 12 = 12%	1988 - 9 = 9%
1983 - 6 = 6%	1989 - 4 = 4%
1984 - 8 = 8%	1990 - 3 = 3%
1985 - 18 = 18%	

GRASS WATERWAYS - BMP-7 -- 1980 THROUGH 1990

1981 - 8,150 = 4%	1986 - 29,119 = 15%
1982 - 5,400 = 3%	1987 - 33,887 = 18%
1983 - 19,370 = 10%	1988 - 4,869 = 3%
1984 - 25,456 = 13%	1989 - 5,200 = 3%
1985 - 52,738 = 27%	1990 - 7,633 = 4%

3.3.3 Accomplishments - Percent of Contracts Performing Each BMP

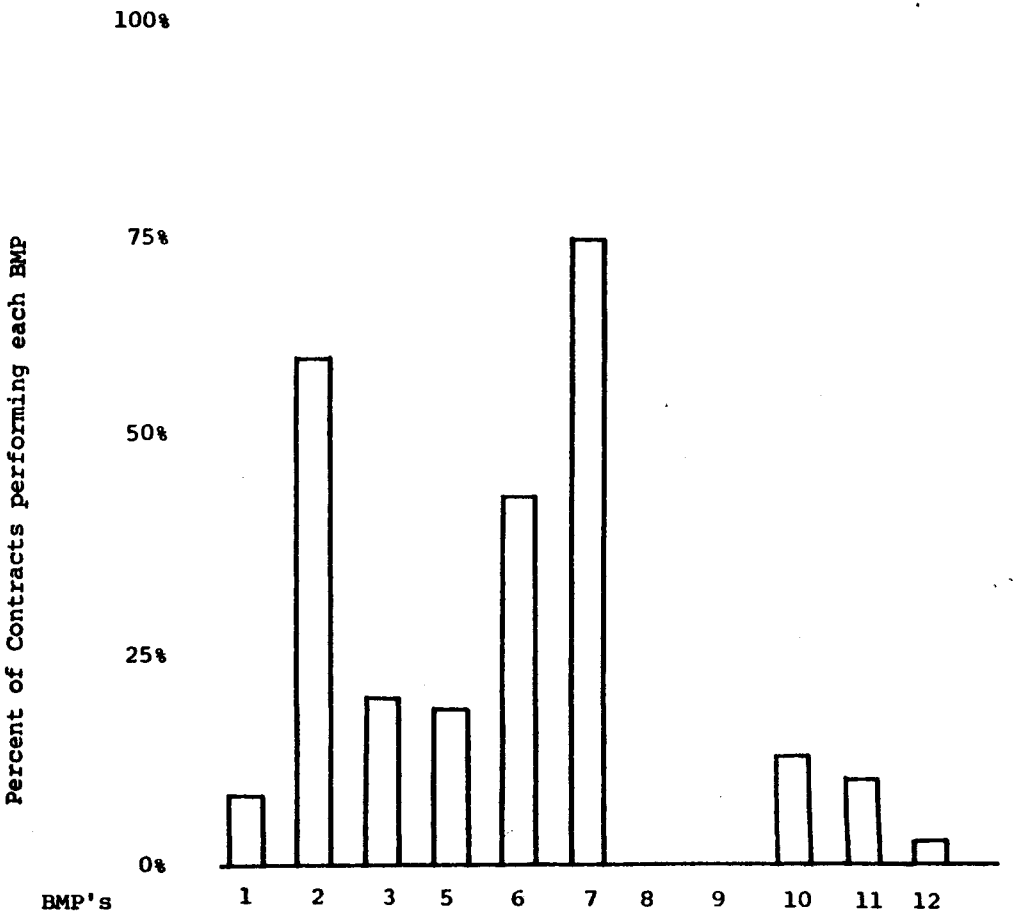


FIGURE 7

Section 3.3.3 - Accomplishments - Percent of BMP-6 (Grazing Land Protection) installed per year.

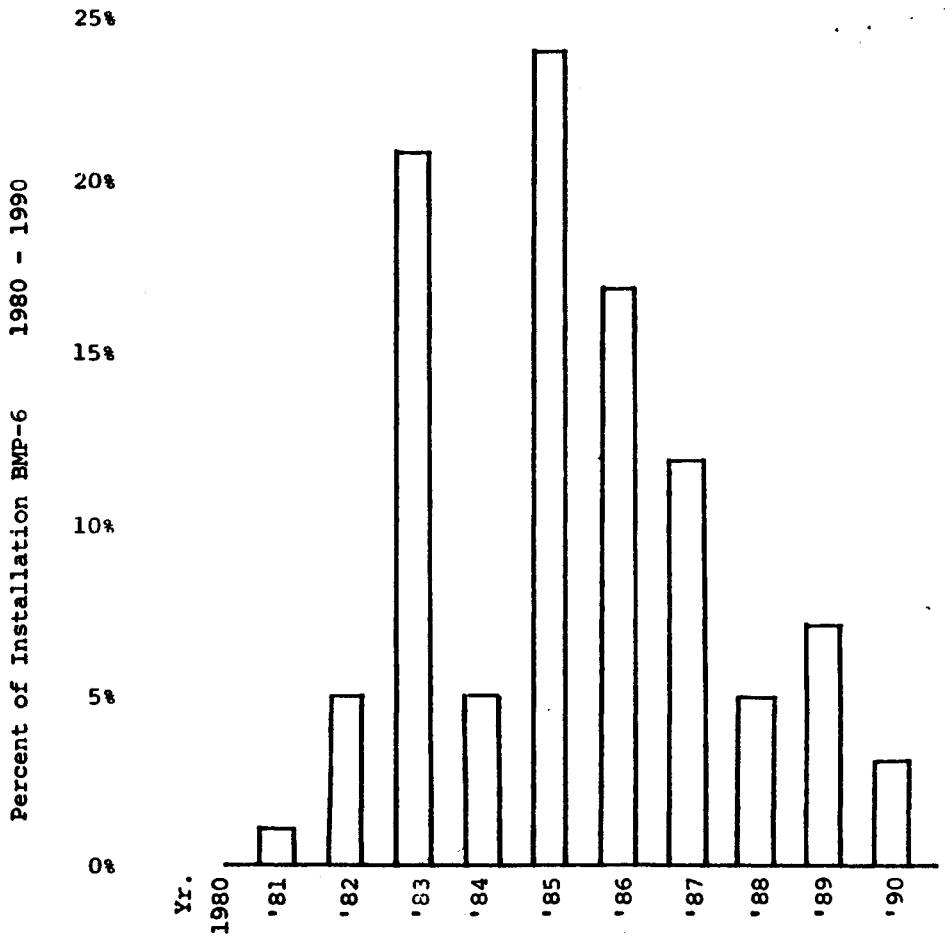


FIGURE 8

Section 3.3.3 Accomplishments - Percent of BMP-7 (Waterway Systems) installed per year.

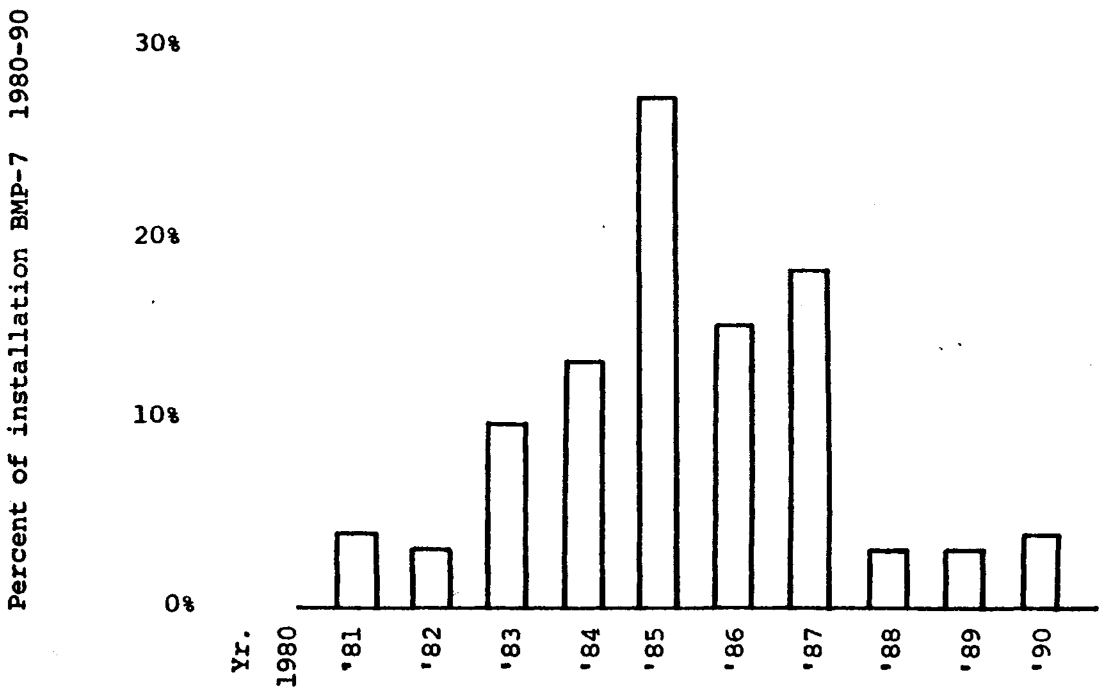


FIGURE 9

Section 3.3.3 - Accomplishments - Percent of BMP-2 (Animal Waste Control Facilities) installed per year.

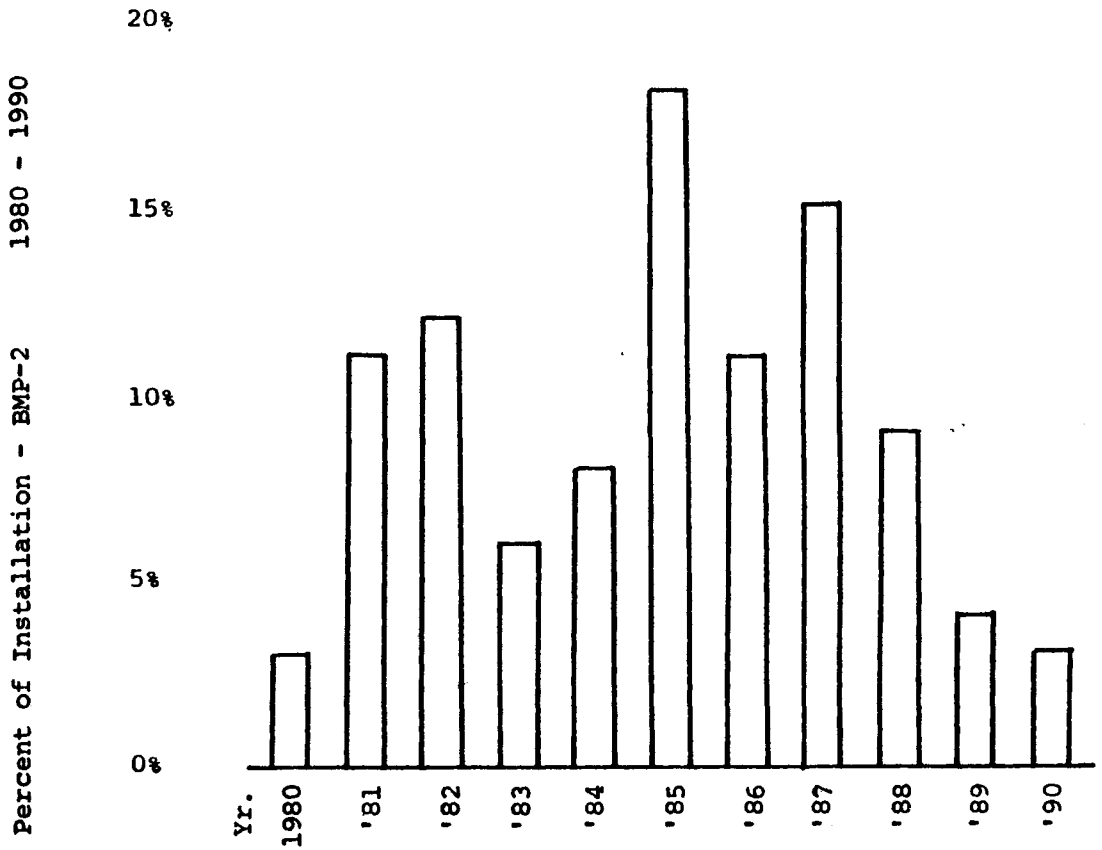


FIGURE 10

Using the three primary BMP's, (BMP-2, BMP-6, BMP-7), from both funds used and project benefit viewpoints, the figures show a fairly even distribution between the three sub-watersheds compared to their size and distribution of contracts.

	BMP-2 (NO.)	BMP-6 (NO.)	BMP-7 (FT.)
Little Pipe Creek	45	43	116,206
Big Pipe Creek	51	40	91,192
West Branch Patapsco	4	1	5,750

3.3.4 DISCONTINUED BMP's UNDER RCWP

Generally the BMP`s were only discontinued in two situations.

Stripcropping was discontinued when a participant changed the farming operation so that the fields were planted in a close growing crop such as hay or small grain and the stripcropping was no longer needed for erosion control.

Animal waste management facilities were not used, when the participant no longer maintained livestock on the farm.

Discontinuance of BMP's within the project area has been relatively minor in relation to the amount of BMP's that have been installed.

3.3.5 CHANGES IN BMP EMPHASIS

As the project progressed, both the farmers and the technicians promoted the use of farmer installed grass swales (Permanent Vegetative Cover on Crop Areas) in lieu of heavy equipment building grass waterways. The farmers referred to these areas as "Thank you M'ams".

Solids separating facilities were built below barnyards and milking facilities to allow the solids to settle out in shallow concrete pits. The water was discharged onto grass filter areas prior to entering stream systems. After several years of use, some times the effectiveness of the system decreases, due to the lack of timely attention from the participant and the degeneration of the filter areas. Whenever possible, holding tanks are now being installed, in place of the solids separator or just below existing solids separators, so that no runoff water from the barnyard or milking facility will flow to the stream.

As the project progressed, the participants were encouraged to install animal waste management facilities with larger capacities. It was found that the smaller facilities would not provide the capacity needed for desirable farm nutrient management.

Ponds (BMP-6) were put into the initial project for the purpose of furnishing a dependable source of water for livestock. As the project progressed, it became evident in most cases, the ponds were located below a dependable spring which furnished most of the water. As a result, it was decided that springs should be developed to furnish the water directly to the watering troughs (Spring Development - BMP-6). The Spring Development could be installed for approximately 25 - 35% of the cost of a pond and generally serve the same purpose.

3.4 CONTRACT MODIFICATIONS AND VIOLATIONS

3.4.1 TOTAL NUMBER OF CONTRACTS

Total number of contract requests were 149 and of these 124 became active contracts.

3.4.2 CONTRACT CANCELLATIONS AND MODIFICATIONS

Six hundred and thirty one (631) modifications were processed -during the 10 years as follows:

241 - To add Best Management Practices
129 - To delete Best Management Practices
212 - To increase cost share monies
17 - To decrease cost share monies
32 - To modify the length of contract or to change the year of application for practices.

3.4.3 CONTRACT VIOLATIONS

The number of contract violations were minor. One farm was sold and the new owner eliminated a practice prior to the end of its lifespan. The money for the practice was refunded by the person who had signed the contract on a prorated basis.

3.5 IMPACTS OF OTHER FEDERAL PROGRAMS

Agriculture Stabilization and Conservation Service (ASCS) Agriculture Conservation Program (ACP) funds were available to landowners with RCWP contracts following the earning of the maximum cost share funds through the RCWP. The ASCS-ACP funds were also available to landowners and operators who wanted to carry out individual conservation improvement practices, but did not need or possibly want an RCWP contract.

The Maryland State Cost Share Program MACS excluded the Double Pipe Creek project area from available state cost share funds during the contract period of the project. Following the conclusion of the RCWP contract period, MACS funds were made available to landowners that did not have RCWP contracts or to the landowners that had exhausted all available RCWP funds. Landowners who had RCWP contracts were not eligible to use MACS funding by canceling their RCWP contracts. It is important to note that the MACS program cost share rate is 87.5% with a $25,000 payment limitation per farm versus the RCWP cost share rate of 75% with a $50,000 limitation.

3.6 IMPACTS OF AND ON STATE AND LOCAL PROGRAMS/REGULATIONS

The state water quality agencies tried to only get involved in unusual problem situations, thereby letting the project take place in a voluntary and experimental atmosphere.

The County and State government let it be known to the Carroll Soil Conservation District Board and Local Coordinating Committee that they were in full support of the project.

As a part of the total program of the Carroll Soil Conservation District, the RCWP project goals and implementation of BMP's within the project area has had a spill-over impact in other parts of the District (county), particularly increasing interest in animal waste management. In part, this was brought about by landowners and operators being able to observe the construction and management of a wide variety of BMP facilities.

3.7 TECHNICAL ASSISTANCE

3.7.1 OVERALL ASSISTANCE PROVIDED TO RCWP PARTICIPANTS

The various agencies functioned much the same as shown in the original plan of work developed June 1980.

The Local Coordinating Committee with the ASCS County Committee Chairman provided overall coordination for the project. During the first several years of the project the committee met bi-monthly and after the contracting phase was completed, it met tri-monthly.

General administration for the project, including contracting, payments, and annual report submission was carried out by the local ASCS staff.

The Soil Conservation Service field office personnel, with an additional person from the Maryland Department of Agriculture and assistance from the SCS area office, provided technical assistance. Assistance included the development of the water quality plans, detail planing for the practices, practice design, practice layout, and construction supervision as appropriate. The staff of the local office of the Cooperative Extension Service was consulted in situations where additional information was considered desirable for the installation of the practice.

The Carroll County office of the Maryland Cooperative Extension Service provided the leadership for the nutrient and pesticide planning and implementation.

3.7.2 TYPES AND AMOUNTS OF ASSISTANCE PROVIDED TO PRODUCERS IMPLEMENTING EACH BMP

A soil conservationist of the local field office worked with the landowners providing general information about the project benefits. Following a request for a contract, the soil conservationist worked with the applicant developing the water quality plan that would show the needed conservation practices to be installed, the year each was scheduled to be installed or carried out, and the estimated cost share (RCWP) funds needed. This plan then formed the basis for the RCWP contract. Following the acceptance of the contract by the ASCS county committee, the SCS technicians carried out the design, layout, construction supervision and final construction check for the planned practices.

The staff from the SCS area office provided additional engineering and soils information assistance. The assistance was mainly needed for animal waste storage structures and some grass waterway installations. Agronomic information and plant material were arranged for through the SCS state office Resource Conservation section and through the Cooperative Extension Service local office.

The Cooperative Extension Service has provided technical assistance for the Nutrient and Pesticide Management BMP's. These two BMP's were added in the middle of the project upon the recommendation of the North Carolina State Review Team. A CES agent was hired to provide technical assistance to producers in the project area. The agent coordinated the Integrated Pest Management program by training and supervising scouts. Nutrient management work involved writing nutrient management plans for the farms that were mandated to include this BMP and those landowners which voluntarily desired to have plans written.

3.7.3 LESSONS LEARNED

1. BMP-2 - Animal Waste Control Facilities

   A. Solid separator facilities need to have baffles, at outlet opening and within the basin if possible to improve trap efficiency. They should only be used for intermittent runoff.

   B. Reed Canary Grass will tolerate the higher nutrient levels in animal waste filter areas better than other grass varieties, but it has the disadvantage of not providing the filtering effect during the winter months like tall fescue.

   C. Picket fences installed in front of the drain outlets of solid manure storage facilities were of very limited value due to clogging.

   D. Gravity feed unloading type manure storage facilities were of little use on the sites where they were installed due to limited head pressure and the need for agitation prior to emptying.

2. Landowners were willing to try new ideas after the staff explained that through the project their contract could be modified to alter the BMP if the original facility did not provide expected results.

3. The water quality improvements placed on the land and the subsequent publicity greatly improved the image of the agricultural community to both the general public and county government.

4.0 PROJECT INFORMATION AND EDUCATION ACTIVITIES

4.1 FINDINGS AND RECOMMENDATIONS

* A wide array of information and education activities were conducted to promote the Double Pipe Creek Project in Carroll County. A sharing of ideas with some of the other 23 projects may have provided additional mechanisms during the first four years, when it was most needed.

* In the Double Pipe Creek Project, excellent cooperation existed between all the agencies. The LCC and I & E subcommittee had good participation from local farm organizations and public officials. Having I & E funding handled separate through CES worked extremely well and enabled projects to be funded quickly.

* At the end of the sign-up period, much effort revolved around one-on-one contacts. More available personnel efforts during this time may have resulted in higher number of contracts.

* A separate budget line should have been developed to provide for the printing of the Annual and Ten Year reports.

* The original guidelines for the project should have clearly shown the expected contents of the yearly, 10 year and closeout reports.

* The tracking and record system could have been better developed at the beginning of the project to facilitate more pertinent data collection in the form latter requested.

4.2 COOPERATIVE EXTENSION SERVICE ACTIVITIES

Responsibilities - Cooperative Extension Service was the overall coordinator of the Information and Education efforts. The CES agent served as chair of the I & E subcommittee the entire ten year period.

Activities

1. Press Conference was held when the Double Pipe Creek project first received approval.

2. Tours - 2 Waste Management tours for farmers to observe completed BMP's and 1 tour for county, state and federal administrators to observe progress of the Double Pipe Creek project.

3. Television - 2 Telecasts on the Double Pipe Creek Project aired on public TV (Channel 67).

4. Radio - Several RCWP announcements were made on the local radio station WTTR by County Extension agent, during his weekly radio program and by SCS Soil Conservationist in special public service announcements.

5. News Releases were written and printed in local county newspapers detailing the Double Pipe Creek meetings, tours and field days.

6. News Articles and feature articles were printed in local county newspapers and the DelMarVa Farmer on the Double Pipe Creek Project.

7. Newsletter articles on the Double Pipe Creek Project appeared in county ASCS newsletters, SCD newsletters and Cooperative Extension Service Farm Notes many times.

8. Informational Displays were built for the Carroll County Fair, CES Mid-Winter Meetings and the Maryland State Fair.

9. A Slide Tape Series on the Double Pipe Creek Project was created and has been used numerous times at meetings, civic clubs and in local feed and machinery stores.

10. Picture Album of sample BMP's was assembled and made available to all agencies working in the project area to be used to review with prospective applicants.

11. Metal Signs were designed by the Local Coordinating Committee and distributed to cooperators after they had completed the first BMP in their contract. These signs read "RCWP Cooperating Farm".

12. Communication has continued throughout the project with Vo-Ag teachers in the county high schools. These teachers brought students to field days that showed completed BMP's. The teachers were encouraged to discuss the Double Pipe Creek Project with students in their classes.

13. Individual Farm Visits were made to talk to landowners in critical areas to encourage their participation in the Double Pipe Creek Project. SCS supervisors mounted a campaign to visit various farms in the project with known soil conservation problems.

14. A Meeting was held with contractors, who build soil conservation BMP's, to inform them of the project.

15. Topics describing the benefits of participating in the Double Pipe Creek Project were included on Cooperative Extension Service Mid-Winter Meeting programs.

16. Plaques were presented to RCWP cooperators who had completed all of their planned BMP's.

17. A Mechanical Ground Water Model was used to show the interaction of ground and surface water and how that water is affected by man. Demonstrations were given to school classes, service clubs and at farm meetings.

18. Manure Spreader Calibration Demonstrations were included during field days and tours.

19. RCWP Newsletter was initiated and mailed to all farms under contract on a quarterly basis.

4.3 - 4.7 I & E ACTIVITIES

The agencies involved worked closely together along with the Local Coordinating Committee and the I & E Subcommittee. It is impossible to separate those activities that were performed strictly by the individual agencies since all projects were coordinated under the aegis of the I & E Subcommittee. The bulk of the work was done by CES, ASCS and SCS. The LCC & SCC approved and helped promote various projects. The agencies responsible for water quality monitoring had a very limited role in the I & E work.

4.8 PUBLIC INVOLVEMENT

Public involvement was provided through membership on the I & E Subcommittee. Initially the I & E planning meeting had excellent participation by government officials. After the beginning phase of the project was completed, public participation dropped dramatically. The last phase of public participation in the project was a survey, conducted by the local ASCS office, of how participants felt about the project. The results are listed in Attachment 2.

4.9 LIST OF PUBLISHED GENERAL INFORMATION

Booklets

- Best Management Practices Tour - December 8, 1981
- Animal Waste Management Tour - November 16, 1982
- Annual Report and Conservation News - 1984
- Rural Clean Water Program - Double Pipe Creek Project Tour March 11 and 12, 1985
- Best Management Progress Tour - July 28, 1988

Flyers

- Double Pipe Creek Rural Clean Water Project
- Questions and Answers About Soil and Water Conservation
- Rural Clean Water Program - Double Pipe Creek - Water Quality Management
- RCWP Update Session - October 1982
- Rural Clean Water Demonstration Day - November 7, 1984
- Best Management Progress Tour - July 28, 1988

Invitation

- Best Management Progress Tour - July 28, 1988

Newspaper Clippings

- Contracts Available For Pipe Creek Area - July 23, 1980 - Evening Sun
- Farm News: Clean Water Contracts Open - July 25, 1980 - Carroll County Times
- Double Pipe Creek: Water Cleanup Project Funded
- August 9, 1980 - The Evening Sun
- Ceremony to Mark First Rural Clean Water Contract - September 16, 1980 - DelMarVa Farmer
- 1st In Nation - September 18, 1980 - Carroll County Times
- Project Reduces Animal Wastes in Little Pipe - September 18, 1980
- Father-Son Team Get First Check in RCWP - September 23, 1980 - DelMarVa Farmer
- Carroll Gets First Facility - October 1980 - Maryland Farmer
- Water Meetings Begin - December 10, 1980 - The Evening Sun
- Pure Water Pilot Program Launched - December 10, 1980 - Carroll County Times
- Farm Briefs: Clean Water - December 30, 1980 - DelMarVa Farmer

- Rural Clean Water Program: It's Helping to Manage Waste in Carroll County - December 15, 1981 - DelMarVa Farmer
- Double Pipe Creek: A New Outlook on Handling Waste - April 28, 1981 - DelMarVa Farmer
- "Clean Water" the byword as Double Pipe Creek Farmers Spruce Up Their Operations - November 2, 1982 - DelMarVa Farmer
- Farming: Rural Clean Water Project Right On Schedule - November 2, 1982 - Carroll County Times
- Waste Management Tour Tuesday - November 15, 1982 - Carroll County Times
- Pits Help End Runoff - April 25, 1983 - Carroll County Times
- Rural Clean Water Program - Summer 1983 - Carroll County Times
- Ag Briefs - Rural Clean Water Program - October 26, 1984 - Carroll County Times
- Carroll County Farmers Face Tough Decision - October 30, 1984 - DelMarVa Farmer
- Maryland to Hold BMP Open House Wednesday - October 30, 1984 - Lancaster Farming
- RCWP Day Set in Carroll - November 7 - 6, 1984 - Frederick Post
- Carroll Farmers Join Clean Water Program - November 6, 1984 - Carroll County Times
- Farm/Business: The Clean Way - November 19, 1984
- Carroll County Times
- Farmers Urged to Apply for RCWP Plan - November 20, 1984 - Frederick Post
- Extension Service to Expand Offices - Carroll County Times

Folders

- Rural Clean Water Program - Double Pipe Creek - Water Quality Management

Fact Sheet

- University of Maryland - "Grassed Waterway Maintenance" was developed for the project.

Proclamation

34-88

CLEAN WATER DAY

WHEREAS, the protection and improvement of the water quality of Carroll County is of utmost importance to the citizens of Carroll County.

WHEREAS, the Agricultural community of the Double Pipe Creek area of Carroll County and the County, State, and Federal Agencies have worked in harmony to develop and carry out the Double Pipe Creek Rural Clean Water Project to protect the waters of Carroll County.

WHEREAS, this project can be an example to demonstrate to the pubic that the agricultural community believes in and is working toward the improvement of Maryland's Water Resources.

NOW, THEREFORE, let it be resolved that July 28, 1988 is:

DOUBLE PIPE CREEK RURAL CLEAN WATER PROJECT DAY

in Carroll County, and encourage all citizens to join us in recognizing this event.

Adopted this 26th day of July, 1988.

COUNTY COMMISSIONERS OF CARROLL COUNTY

John L. Armacost, President

Julia W. Gouge, Vice President

Jeff Griffith, Secretary

FIGURE 11

5.0 INSTITUTIONAL RELATIONSHIPS AND ECONOMICS

5.1 FINDINGS AND RECOMMENDATIONS

* A finding under project administration is that the agencies roles and personnel changed during the ten year life span of the project. The change in personnel can be noted from the LCC up to the NCC, but changes in personnel seemed to have a minimal effect on the project reaching its original goals and objectives.

5.2 INSTITUTIONAL ARRANGEMENTS

5.2.1 PROJECT ADMINISTRATION

As the project progressed, the roles of the governmental agencies and advisory groups that were involved shifted. Several of the groups and agencies which participated in the proposal and initial information and education efforts became less involved when implementation was a main priority. Likewise those who were less involved in initial efforts became more of a factor later in the project.

The following Carroll County Agencies remained instrumental in the success of the project.

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

As the administrator of the project, the ASCS Office was responsible for approving all contracts, modifications, terminations, payments and other administrative activities. They maintained all records, monitored implementation, administered LCC meetings and prepared the annual progress report and plan of work each year. The Carroll County ASCS office and the County Committee were heavily involved in the project from the submission of the proposal through the preparation of the Ten Year Report. They were the agency with the primary administrative duties and responsibilities.

SOIL CONSERVATION SERVICE

Soil Conservation Service was the agency with technical responsibility. The SCS Office in Carroll County prepared conservation plans, designed practices, supervised all construction, and completed status reviews for participants. This agency, along with ASCS, SCD and CES, was instrumental in submitting the proposal and carrying out the objectives of the program through completion. The SCS office was involved in the planning and implementation phases of the project.

EXTENSION SERVICE

The Cooperative Extension Service had primary responsibility for the information and education effort. The State CES Agriculture Program Leader handled Information and Education funds which were directed from ES-USDA to Maryland CES. The local Agriculture Extension Agent worked closely with State Agriculture Program Leader, providing him with yearly I & E status reports and received funding approval for I & E projects. Local decisions to call I & E meetings and coordinating local I & E efforts were the responsibility of the local CES agent.

CARROLL SOIL CONSERVATION DISTRICT

Carroll Soil Conservation District Board was instrumental in submitting the original application for the project and maintained a vital interest throughout the 10 year period. The District Board Members and staff promoted the project through individual contact with landowners in the project area, assisted with publicity and information activities and provided assistance as a member of the Local Coordinating Committee.

CITY OF WESTMINSTER

The City of Westminster, Waste Water Treatment Plant representative was active in the LCC and provided requested information throughout the project. The 1988 Best Management Tour included a stop at the plant.

CARROLL COUNTY GOVERNMENT

The county government Water Resources department representative was active in the LCC and kept the group up to date on county programs. Their support was evident through the issuance of a special county proclamation in 1988.

MD DEPT. OF NATURAL RESOURCES

Forestry Service and Fisheries and Wildlife Administration were actively involved in the LCC. Both agency representatives attended LCC meetings and informed the committee of other ongoing programs in the region.

MD DEPT. OF HEALTH & MENTAL HYGIENE & MD DEPT. OF ENVIRONMENT

The Department of Health and Mental Hygiene and the Maryland Department of Environment were involved in the LCC and responsible for the water quality monitoring program.

5.2.2 LCC/SCC COORDINATION

The Local Coordinating Committee was successful in over-seeing the program from the initial stage. The State Coordinating Committee was involved in the initial proposal and became less involved as the project progressed. It was due to the excellent leadership of the LCC and the cooperation between the local agencies and local groups, that the SCC was not actively involved in the project during the latter stages. Had the LCC requested assistance or had problems, the SCC may have become a factor. In this project however, the SCC was not needed to be a major contributing factor.

5.2.3 BMP MAINTENANCE TRACKING

The maintenance requirements for BMP's have been tracked by ASCS and SCS in the following ways:

1. SCS - The Soil Conservation Service performs annual status reviews on all contracts that are active. Appendix 1 is an example of a status review conducted for a current RCWP contract.

2. ASCS - the Agriculture Stabilization and Conservation Service office reviewed installed practices for maintenance when duties required an ASCS employee to be on a project farm.

5.2.4 ASSESSMENT OF ASSISTANCE PROVIDED BY FEDERAL, STATE and LOCAL AGENCIES

The ASCS, SCS and Extension Service offices provided the major contact and carrying out of the project on a day to day contact with landowners and landoperators, supplying information, technical services and administrative assistance.

The Carroll Soil Conservation District Board provided general support, carried out individual landowner contact and served on various committees.

The representatives of the City of Westminster support was of great value by providing water quality data from the city and water quality data interpretation guidance to the various local offices.

The Department of Health and Mental Hygiene and the Department of the Environment provided guidance and monitoring program administration that was unavailable at the local level.

In summary, the agencies roles and amounts of time provided for the project varied considerably, but all made vital contributions to the project.

5.3 ECONOMIC EVALUATION

5.3.1/5.3.2 Installation cost of each BMP and the proportion costshared by RCWP.

The actual cost and amount of cost share received for each BMP are listed below. The percentage cost shared is also included.

	Actual Cost	Cost Share	Actual % Cost Shared	Percent of Total Funds Used for each BMP
BMP 1	59,342	36,479	62 %	1.0
BMP 2	2,315,157	1,631,871	71 %	58.0
BMP 3	36,362	27,073	75 %	1.0
BMP 5	38,317	28,298	74 %	1.0
BMP 6	351,048	237,960	68 %	9.0
BMP 7	1,089,166	753,972	69 %	26.0
BMP 8	221	118	53 %	*
BMP 10	45,263	34,007	75 %	1.0
BMP 11	5,149	3,366	65 %	*
BMP 12	15,702	11,800	75 %	*
BMP 15	17,396	13,142	76 %	*
BMP 16	20,232	14,973	74 %	*
Total	3,993,355	2,793,059	Ave. 70 %	97.0

** Less than one percent.*

5.3.3 TOTAL PROJECT EXPENDITURES

According to information supplied by the SCC, expenditures for the project were as follows:

Federal funds for Information and Education	$241,800
State and County I & E Funds	270,100
Soil Conservation Technical Funding	946,000
Cost shares allocated to project	$3,576,137
	$5,033,937

Expenditures for monitoring came from EPA and State government.

5.3.4 INSIGHTS AND OBSERVATIONS ABOUT THE COST EFFECTIVENESS OF DIFFERENT BMP'S REDUCING POLLUTANT LOADINGS AND HOW THE OVERALL PROJECT MIGHT HAVE BEEN MADE MORE COST EFFECTIVE.

1. Use critical area seeding (with minor land shaping in concentrated flow areas) as a cost sharing item before erosion causes a gully.

2. Continue to allow cost sharing for portable pumps for animal waste management facilities for two reasons:

    A. Many times a participant will have two facilities (either two storage, reception pit and main storage pit, etc...) and the pump can be moved to be used in both facilities.

    B. Pumps, if portable, can be easily removed from a manure facility (that may only be emptied each 5-6 months) cleaned and stored in a protective area.

3. Cost share on relocation of concentrated (outside) livestock holding areas when relocating the area away from the stream or intermittent watercourse is the most practical solution or a partial solution to improving water quality.

   Cost sharing would include such items as constructing travel-ways (concrete, if needed) with fencing and gates, fencing of the new holding area and re-habitating the old area to establish permanent grass. Building of new buildings would be excluded from the cost sharing.

4. BMP 15 and BMP 16 -- Since this is a relatively new emphasis and they are critical as support practices, cost share should be for a 5 year period at 75%.

5. Develop a cost sharing program for project participants to do stream monitoring at points where water enters their property. Locations would be pre-selected as part of a monitoring plan.

   A. This could develop a better water quality awareness by the participants.

   B. This would provide basic data and reliable data from the standpoint of the sampling person being at the site during or immediately following storm events. This would be much more cost effective than employing someone to travel to the site each time.

6.0 MONITORING PROGRAM DESCRIPTION.

6.1 FINDINGS AND RECOMMENDATIONS.

* Water quality in Big Pipe Creek improved between 1982 and 1990.

* Instream concentrations of ammonia (NH4) and total organic carbon (TOC) decreased between 1982 and 1990.

* Ammonia concentrations (NH4) in Big Pipe Creek decreased by 44% over the period.

* Total organic carbon (TOC) concentrations decreased by 51% over the period.

* Instream concentrations of total nitrogen and nitrate-nitrite nitrogen (NO23) increased between 1982 and 1990.

* Nitrate-nitrite nitrogen (NO23) concentrations in Big Pipe Creek incrceased by 34% over the period.

* Total nitrogen (TN) concentrations in Big Pipe Creek increased by 25% over the period.

* The results of the monitoring program indicate that the State's turbidity and fecal coliform standards are exceeded regularly in Big Pipe Creek.

* Control of monitoring sites and contract performance needs to be guaranteed for monitoring sites.

6.2 GENERAL STRATEGY.

The specific water quality goals of the Double Pipe Creek Rural Clean Water Project are to reduce the level of fecal coliform bacteria in stream below the State Standard of 200 MPN/100 ml, and to meet the State Standard for turbidity in stream (150 NTU, JTU, or FTU units or a monthly average of 50 units) at all times. The more general goal of the project is to improve water quality.

The goals of the water quality monitoring program being conducted to support the Double Pipe Creek RCWP are to:

1. Detect long term trends in water quality and measure the effectiveness of BMPs.

2. Determine the project's impacts on turbidity levels and fecal coliform levels in Big Pipe Creek.

The water quality monitoring program has two elements. The first element is designed to detect long term changes in water quality. The second element of the water quality monitoring program is a "Before/After" study to measure the effectiveness of a specific set of BMPs.

6.4 SURFACE WATER

SITE SELECTION

The water quality monitoring program has been conducted in two phases. The first phase was conducted by Versar Inc., under contract with the Maryland Department of Health and Mental Hygiene (Versar, 1982). Versar Inc. was contracted to conduct a water quality monitoring program for the Monocacy River basin with special emphasis in the Double Pipe Creek sub watershed. The work plan developed by Versar Inc. for the first phase of the water quality monitoring program in Double Pipe Creek had three objectives;

1. To establish a "near-term" water quality data base for Double Pipe Creek,

2. To evaluate the short-term effectiveness of animal waste and erosion control practices,

3. To develop a long-term monitoring program plan to be implemented at the conclusion of the Versar work.

Data was collected by Versar Inc. at the USGS gaging station on Big Pipe Creek at Bruceville (Figure 12), and at three single land use sites within the Double Pipe Creek basin from November 1982 to June 1985.

The water quality monitoring plan required sampling at the three single land use sites before and after BMP implementation to evaluate the effectiveness of animal waste and erosion control practices. Monitoring at two of the single land use sites was conducted prior to BMP installation, but due to constraints on the landowners, BMPs were not installed at the two sites. BMPs were installed at the third site during the pre-BMP monitoring period. Since there was no pre-BMP monitoring at the third site to measure against, post-BMP monitoring was not conducted.

The contract with Versar Inc. expired in 1986. Versar Inc. provided a final report of its findings (Versar, 1986) and the monitoring stations were deactivated. The final report presented by Versar Inc. included a proposed design for Phase II of the water quality monitoring program. The Phase II design proposed selecting three new single land use sites, continuing the Bruceville site, and adding a second stream monitoring site.

The water quality monitoring program design proposed by Versar for Phase II was not implemented. The resources were not available to fund such an ambitious program. Phase II of the water quality monitoring program began in the spring of 1987, when the Bruceville site was reactivated by the Maryland Department of the Environment (Table 2). Table 2 shows the schedule of tasks for Phase II of the monitoring program. The work plan for Phase II of the water quality monitoring program (MDE,1989) called for monitoring at the Bruceville site on Big Pipe Creek and the installation of a monitoring site in one small single land use basin.

Water quality data and flow data during storm events has been collected at the Bruceville site since 1987 and will be collected through 1992. The storm event water quality and flow data from the two phases of the water quality monitoring program has been merged into a single data set.

The Lease's farm, in Union Bridge, was selected in 1988 as the new single land use site for the water quality monitoring program (Figure 12). The Lease Farm is a dairy farm that straddles Little Pipe Creek just east of Union Bridge. The Farm has approximately 140 acres of cropland and approximately 50 acres of pasture adjacent to the farmstead. They milk approximately 100 cows. Currently, the Lease's scrape manure off their feedlot into a spreader and spread manure regularly. The manure is spread on pasture and cropland.

Carroll County - Double Pipe Creek Rural Clean Water Project Area
BMP - Non-Point Source Monitoring Site

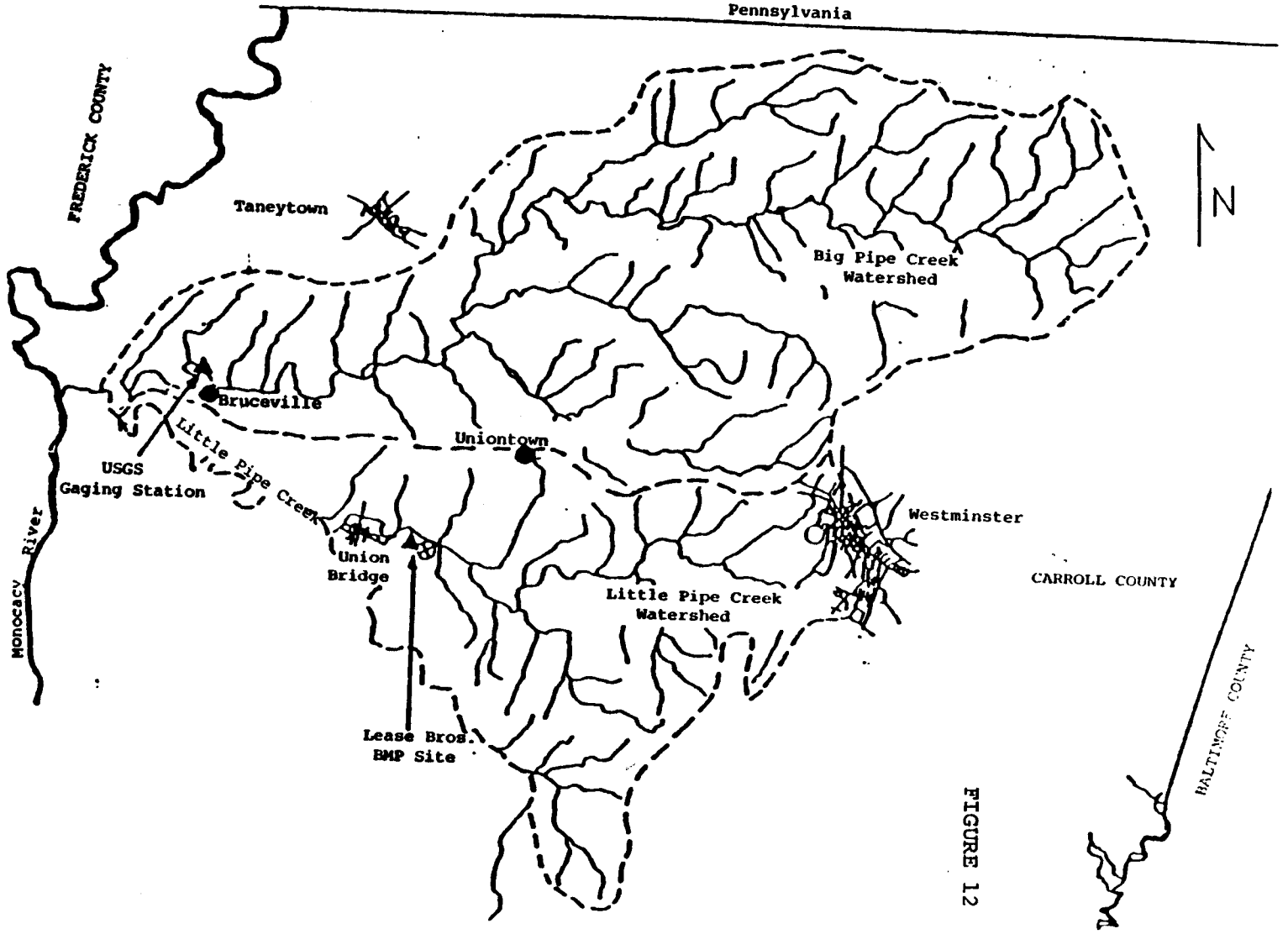
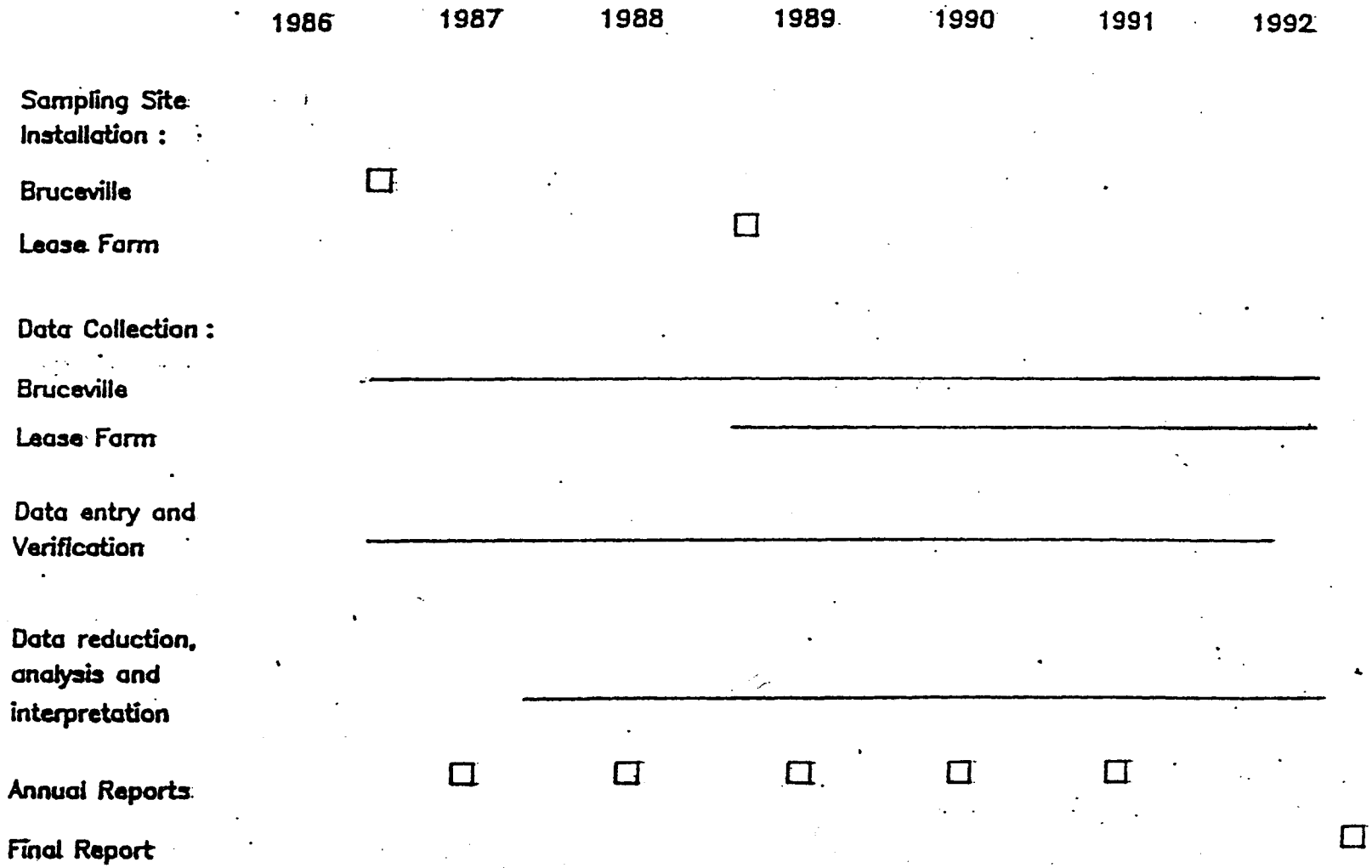


FIGURE 12

TABLE 2

Schedule of Tasks and Projects



The farm site sampling station is located on the North side of the railroad tracks at the base of a 37 acre drainage basin within the Lease's farm (Figure 13). The barn, feedlot, out buildings and residence are all located within this small basin. During storm events runoff collects in a pool on the south side of the railroad tracks and discharges down a water way (Figure 14) to Little Pipe Creek.

The water quality monitoring site at the Lease's farm was activated in May of 1989. The Leases agreed to postpone the implementation of the Best Management Practices called for in their RCWP contract until 1990. This provided time to characterize water quality prior to implementation. Following the implementation of BMPs on the Lease's farm, water quality will be monitored during both storm and baseflow conditions.

OTHER DATA SOURCES

Water quality data has been collected at the Bruceville site (BPC0035) since 1978 on a regular monthly basis as part of the State's on going Core Monitoring Network. The water quality data collected by the Core program from 1978 through mid-1990 has been merged with the storm water quality data collected by MDE and by Versar for the purposes of this analysis.

MONITORING PARAMETERS AND FREQUENCY OF COLLECTION

Baseflow samples are collected on a monthly basis at the Lease site as part of Phase II of the RCWP monitoring program. Baseflow samples are collected on a monthly basis at the Bruceville site as part of MDE's Core Monitoring Program.

Two to three storms per season (8 to 12 per year) are being sampled at both sites. The parameters being collected at both sites are the same parameters (Table 1) as originally collected by Versar. This was done to maintain comparability between the data sets.

MONITORING SITE LOCATION AND WATERSHED MAP

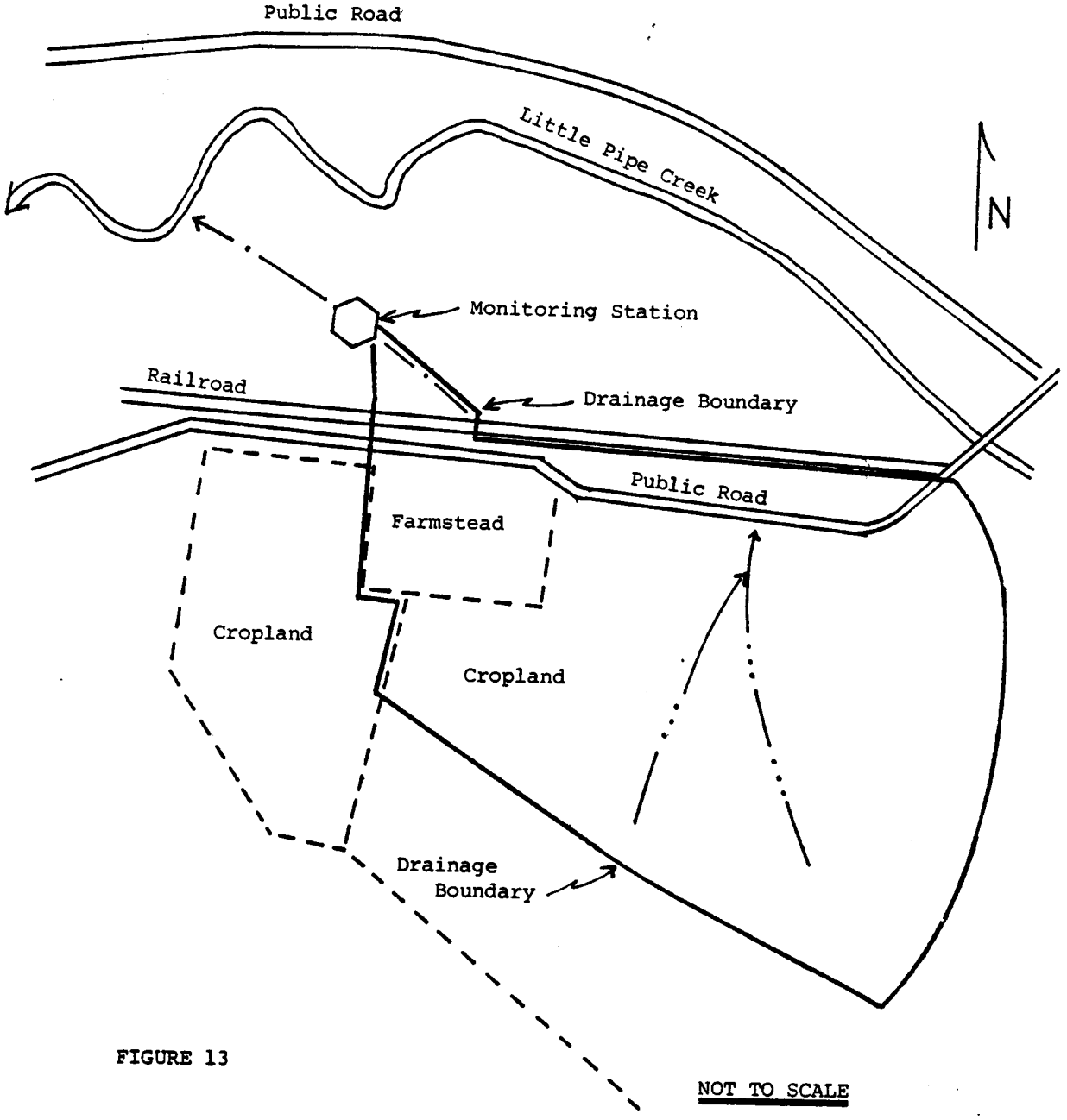


FIGURE 13

NOT TO SCALE

Monitoring Station/Farmstead Diagram

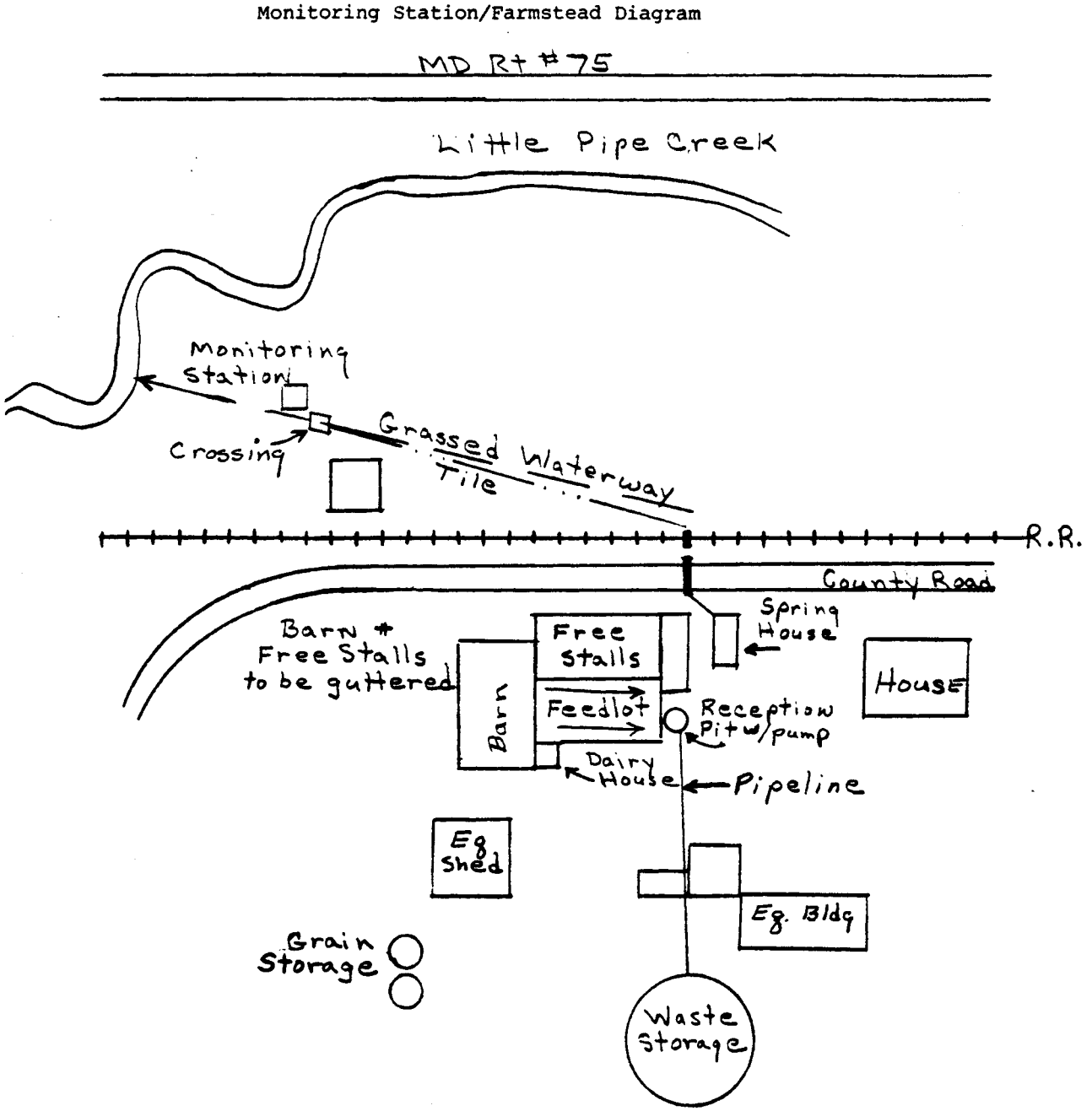


FIGURE 14

NOT TO SCALE

PARAMETER SUMMARY

Parameter	Type of Sample	Preservation
Coliform, fecal	Water	4°C
Coliform, total	Water	4°C
Conductance, specific	Water	N/A
Nitrogen, ammonia	Water	4°C, H_2SO_4 to pH 2
Nitrogen, nitrate	Water	4°C
Nitrogen, nitrite	Water	4°C
Nitrogen, total kjedahl	Water	4°C, H_2SO_4 to pH 2
Oxygen, dissolved	Water	N/A
pH	Water	N/A

+Reference given in Table 2, Part B

TABLE 1
FOR DOUBLE PIPE CREEK STUDY
PART A

Holding Time	Method+	Detec Lim
6 hours	MPN	3 MPN
6 hours	MPN	3 MPN
analyze	electrode	0.3 m
28 days	automated phenate	0.008
48 hours	automated CD reduction	0.02 n
48 hours	diazotization	0.002
28 days	semi-automated salicylate	0.1 mg
analyze	electrode immediately	0.2 mg
analyze	electrode immediately	0.1

TABLE 1 (cont.)
PARAMETER SUMMARY FOR DOUBLE PIPE CREEK STUDY
PART A

Parameter	Type of Sample	Preservation	Holding Time	Method+	Detectio Limit
Phosphate, ortho	Water	Filter, 4°C	48 hours	automated single reagent	0.004 mg
Phosphorus, total	Water	4°C, H_2SO_4 to pH 2	28 days	semi-automated	0.01 mg/
Solids, total dissolved	Water	4°C	7 days	gravimetric	1.0 mg/l
Solids, total suspended	Water	4°C	7 days	gravimetric	1.0 mg/l
Solids, volatile suspended	Water	4°C	7 days	gravimetric	1.0 mg/l
Temperature	Water	N/A	analyze immediately	electrode	-5°C
Turbidity	Water	4°C	48 hours	nephelometric	0.5 NTU

+References given in Table 2, Part B

PART B

TABLE 1 : PARAMETER SUMMARY FOR DOUBLE PIPE CREEK STUDY
ANALYTICAL REFERENCE

Parameter	Type of Sample	Analytical Reference
Coliform, fecal	Water	Standard Methods for the Examination of Water and Wastewate (1985): Method 908C
Coliform, total	Water	Standard Methods for the Examination of Water and Wastewate (1985): Method 908A
Conductance, specific	Water	Hydrolab System 8000 Water Quality Instrumentation Manual (1978)
Nitrogen, ammonia	Water	Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020:350.1
Nitrogen, nitrate	Water	Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020:353.2
Nitrogen, nitrite	Water	Technicon Auto Analyzer II, Industrial Method No. 102-70W/C
Nitrogen, total kjeldahl	Water	Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020:351.2
Oxygen, dissolved	Water	Hydrolab System 8000 Water Quality Instrumentation Manual (1978)

PART B (cont.)

TABLE 1 : PARAMETER SUMMARY FOR DOUBLE PIPE CREEK STUDY
ANALYTICAL REFERENCE

Parameter	Type of Sample	Analytical Reference
pH	Water	Hydrolab System 8000 Water Quality Instrumentation Manual (1978)
Phosphate, ortho	Water	Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020:365.2
Phosphorus, total	Water	Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020:365.4
Solids, total dissolved	Water	Standard Methods for the examination of Water and Waste.
Solids, total suspended	Water	Standard Methods for the Examination of Water and Wastew (1985): 209.C
Solids, volatile suspended	Water	Standard Methods for the Examinaition of water and Wastev (1985): 209.d
Temperature	Water	Hydrolab System 8000 Water Quality Instrumentation Manual (1978)
Turbidity	Water	Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020:180.1

SAMPLING PROCEDURES

FLOW

The Big Pipe Creek site is a USGS gaging station. The monitoring equipment was installed in a shed adjoining the gaging station. Equipment at the site is set up to utilize the specific stream flow rating tables calculated by USGS. The local district office of USGS is contacted on a regular basis for rating curve adjustments and flow records.

The water quality sampling station at the Lease's farm is located immediately down stream from a concrete crossing with a corrugated metal culvert. Monitoring equipment was installed in a shed adjacent to the concrete crossing. Flow through the pipe is estimated using the Mannings Formula (Grant, 1985). The pipe rating is verified by MDE's field crew using manual flow measurements taken at a range of flow conditions.

WATER QUALITY

Baseflow sampling is being conducted on a monthly basis at the Big Pipe Creek site and at the Lease site. Samples are collected, packed in ice, and sent to the Maryland Department of Health and Mental Hygiene for analysis (DHMH 1981). Flow proportioned composite storm water quality samples are being collected at the Big Pipe Creek site and at the Lease site. The automated water quality samplers are triggered by flowmeters calibrated for each site. Approximately 10 events per year are being collected at each site.

The sampling equipment is stage activated. Prior to a predicted event the samplers are iced and serviced. A predicted storm is any storm occurring during the work week with a 50% or greater chance of rain. Following a storm event that is sampled, field personnel collect the samples and perform the necessary in-field operations. Samples are iced and returned to the laboratory. Following sample collection, the equipment at the station is examined, serviced, and set up to sample the next storm. Sampling lines are cleaned, flowmeters are recalibrated, and strip charts are retrieved (MDE,1989). For all the above samples, a portion of each sample is collected in a plastic bottle, packed in ice, and analyzed for total kjeldahl nitrogen, volatile suspended solids, total phosphorus, total suspended solids, and turbidity. Another portion is filtered through a 0.45 um membrane filter, packed in ice, and analyzed in the laboratory for total kjeldahl nitrogen, ammonia nitrogen, nitrate nitrogen, total phosphorus, ortho phosphorus, and total dissolved solids. A separate sample is collected in a sterilized 250 ml plastic bottle pretreated with thiosulfate and packed in ice until processed in the laboratory for total and fecal coliform.

DATA HANDLING AND ANALYSIS

The data was compiled in a single data base and verified. The data was then plotted against time (Figures 1 thru 5) and the plots were reviewed. It was observed that the DHMH Laboratory detection limits for PO4, NH4, and TP were 0.1, 0.2, and 0.1 mg/l respectively, on numerous occasions between January 1983 and November 1985. Current DHMH Laboratory detection limits for PO4, NH4, and TP are .004, .008, and .01 respectively. The higher detection limits biased the data towards the upper end of the range of recorded concentrations. The data for these three parameters was reviewed. To avoid biasing the data towards the high end of the concentration range, the data recorded as < the higher detection limits for NH4, PO4, and TP was set to the lower detection limit (Figures 3 and 4). The data still is biased, but the data is now biased towards the low end of the concentration range. This will make any decreasing trends more difficult to detect.

Since there was no storm event water quality monitoring during 1986, all water quality data from that year was excluded from the analysis.

The monitoring at the Lease site is still in the "Before" phase. Appropriate statistical methods will be used to analyze the data at the conclusion of the "After" phase.

Two different methods were used to evaluate time trends in the data. Simple linear regression of the water quality constituent of interest (i.e. TN or TP) against two parameters, time and time squared, results in a curved line fit to the data. The significance of the time parameters of the regression model indicates the significance and direction of the overall time trend.

The second trend analysis method involves fitting of a smooth curve to the data using the LOWESS method (Cleveland, 1979). The LOWESS curve is a smooth line through the center of the data and results in a visual confirmation of the accuracy of the regression line.

The trend analysis was first carried out on the log transformed data. Log transformation is necessary in order to spread out the distribution of the data in the lower concentration ranges where arithmetically plotted data tends to bunch up (see Figures 1-5). The results of the trend analysis are presented in Figures 6-10. Each of these figures presents a scatter plot of the log transformed data, a smoothed line through the data, the regression line for log transformed constituent concentrations against time and a reference line at the mean predicted log concentration.

In Figure 6, significant increasing trends (95% confidence level) for both flow and TN are shown.

Figure 7 shows a significant (90% confidence level) increasing trend in nitrate-nitrite nitrogen concentrations and no trend in total kjeldahl nitrogen.

Figure 8 shows no trend in ammonia nitrogen (NH4) concentrations and fecal coliform densities (FCOL).

A significant trend (90% confidence level) in ortho phosphate (PO4) concentrations and a significant (90% confidence level) increasing trend in total phosphorus (TP) concentrations are shown in Figure 9.

Figure 10 shows no trend in either total suspended solids (TSS) or total organic carbon (TOC) concentrations.

As presented above the variability in the data is only addressed using time. Concentration is a function of flow for most constituents and flow varies both seasonally and annually. Flow during the study period increased significantly with time. To detect a true trend it is necessary to adjust the data for both flow and seasonal variations. In effect by holding flow and seasonal differences constant, the relationship between concentration and time (trend) can be determined.

Time trends in flow and season adjusted residuals are presented in Figures 11 through 15. The figures present a scatter plot of the flow and season adjusted residuals, a smoothed line through the data, the regression line for flow and season adjusted residuals against time, and a reference line at zero.

Figure 11 shows a significant (90% confidence level) decreasing trend in ammonia concentration and a significant increasing (95% confidence level) trend total nitrogen concentrations.

Figure 12 shows a significant (95% confidence level) increasing trend in nitrate-nitrite nitrogen concentrations and no trend in total kjeldahl nitrogen concentrations.

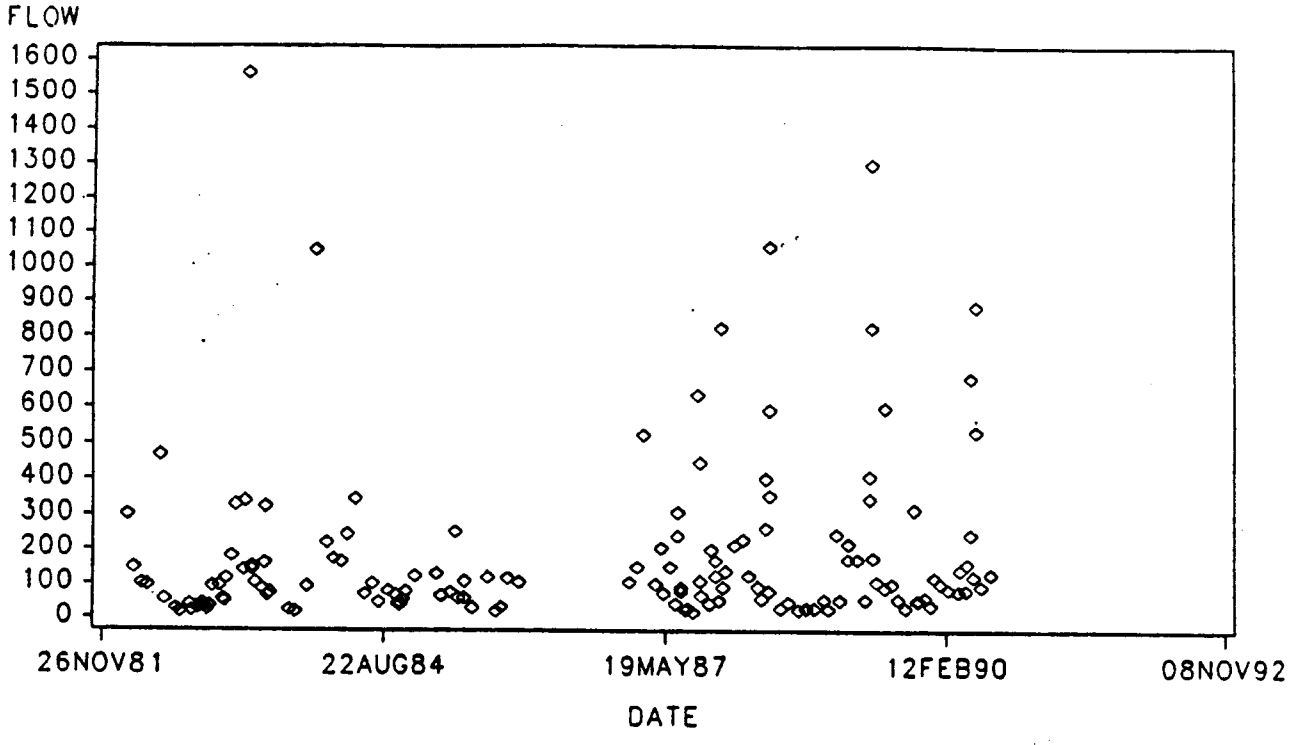
Figure 13 shows no trend in ortho phosphate and total phosphorus concentrations.

Figure 14 shows no trend in total suspended solids concentrations and a significant (95% confidence level) decreasing trend in total organic carbon concentrations.

No trend in fecal coliform densities is shown in Figure 15.

FIGURE 1: BIG PIPE CREEK AT BRUCEVILLE

FLOW MEAN DAILY DISCHARGE



BIG PIPE CREEK AT BRUCEVILLE
TN CONCENTRATION MG/L

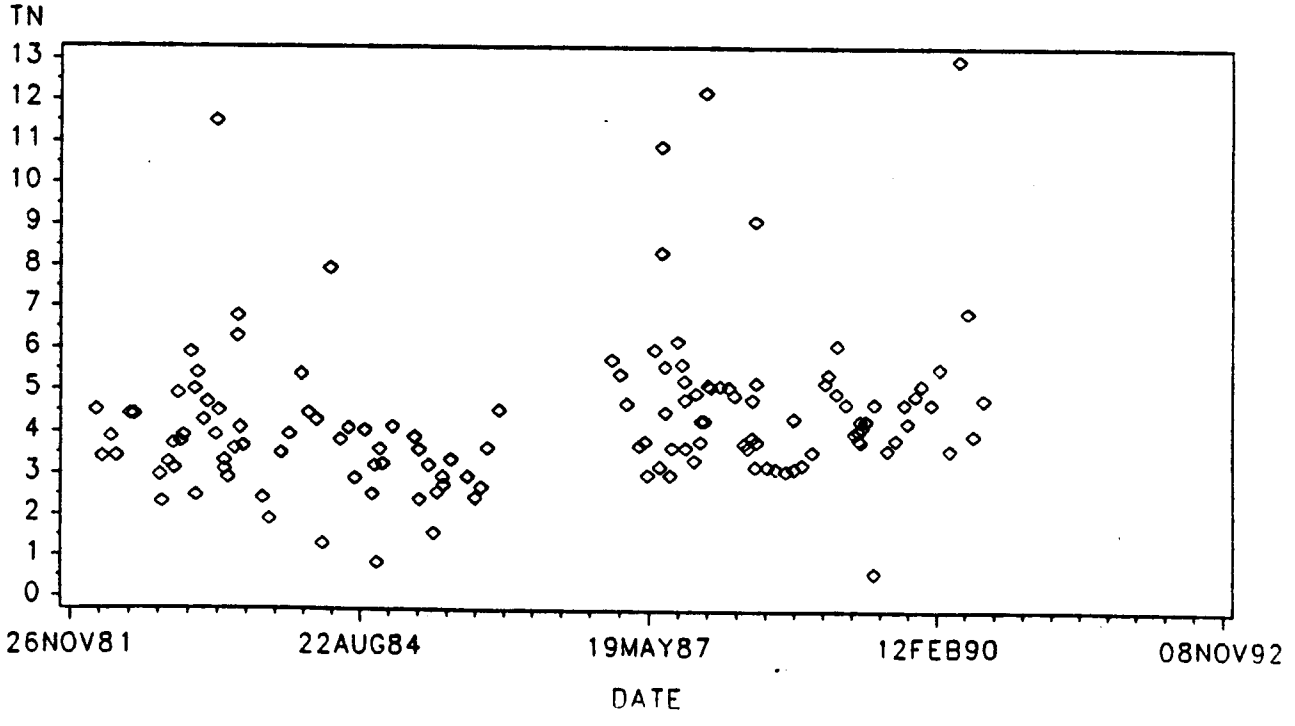
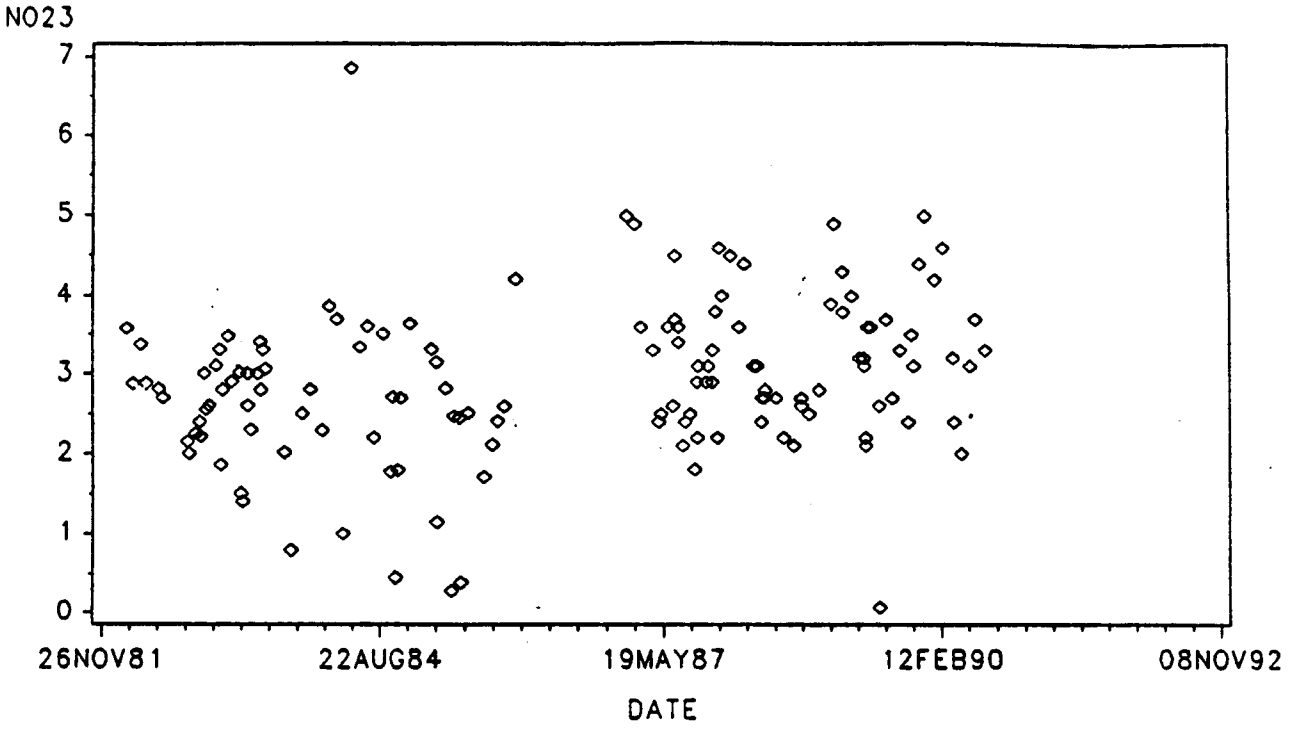


FIGURE 2: BIG PIPE CREEK AT BRUCEVILLE

NO23 CONCENTRATION MG/L



BIG PIPE CREEK AT BRUCEVILLE
TKNW CONCENTRATION MG/L

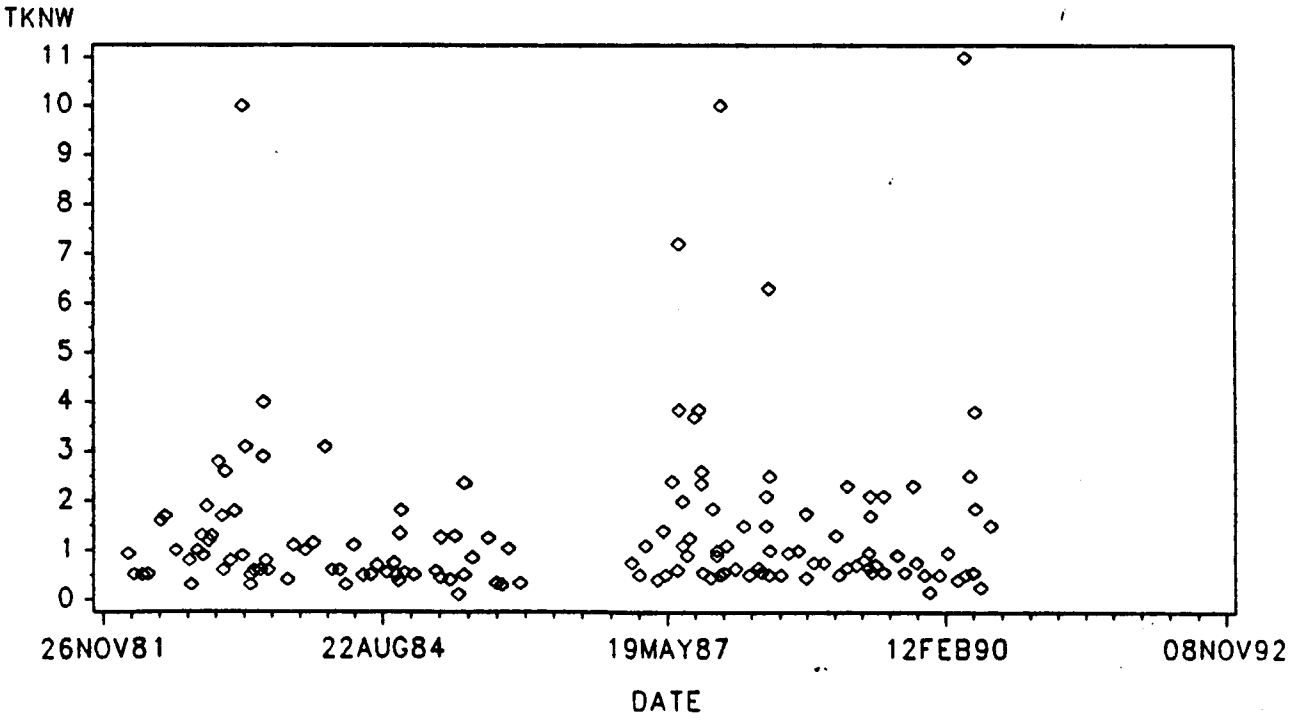
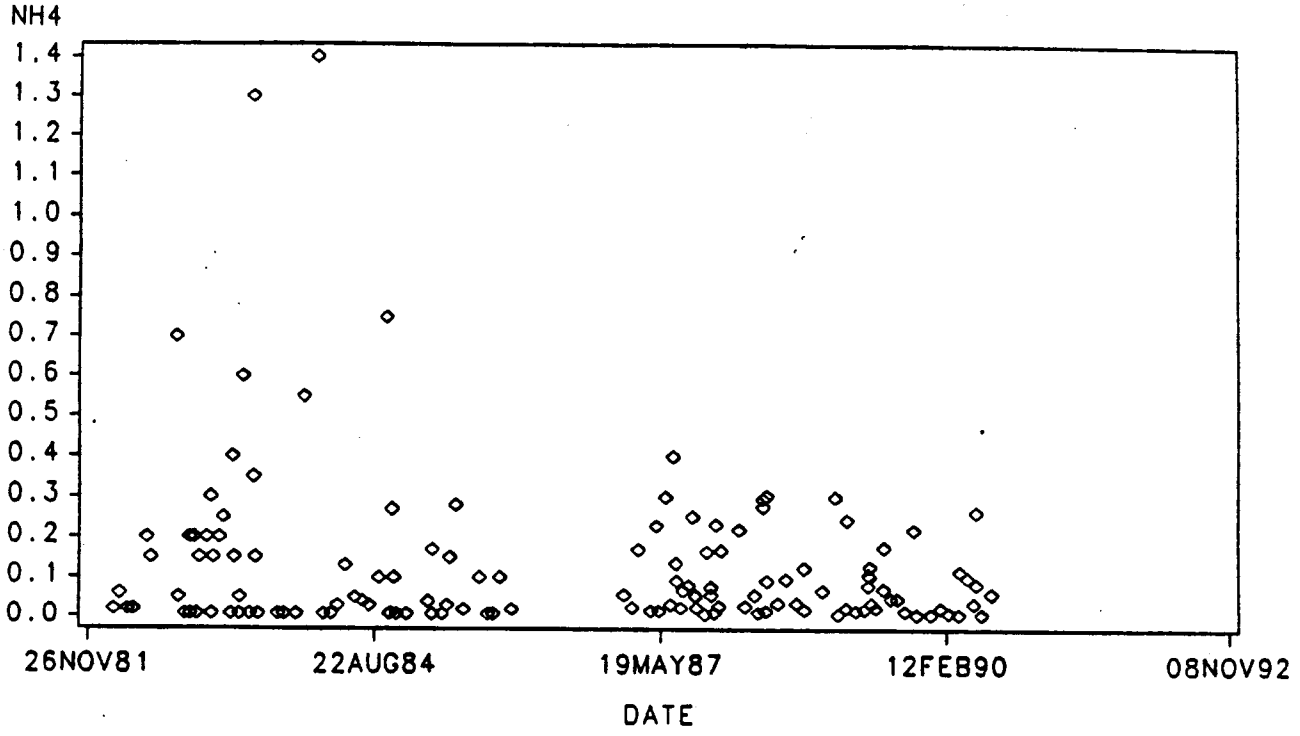


FIGURE 3: BIG PIPE CREEK AT BRUCEVILLE

NH4 CONCENTRATION MG/L



BIG PIPE CREEK AT BRUCEVILLE
FECAL COLIFORM CONCENTRATION MPN/100 ML

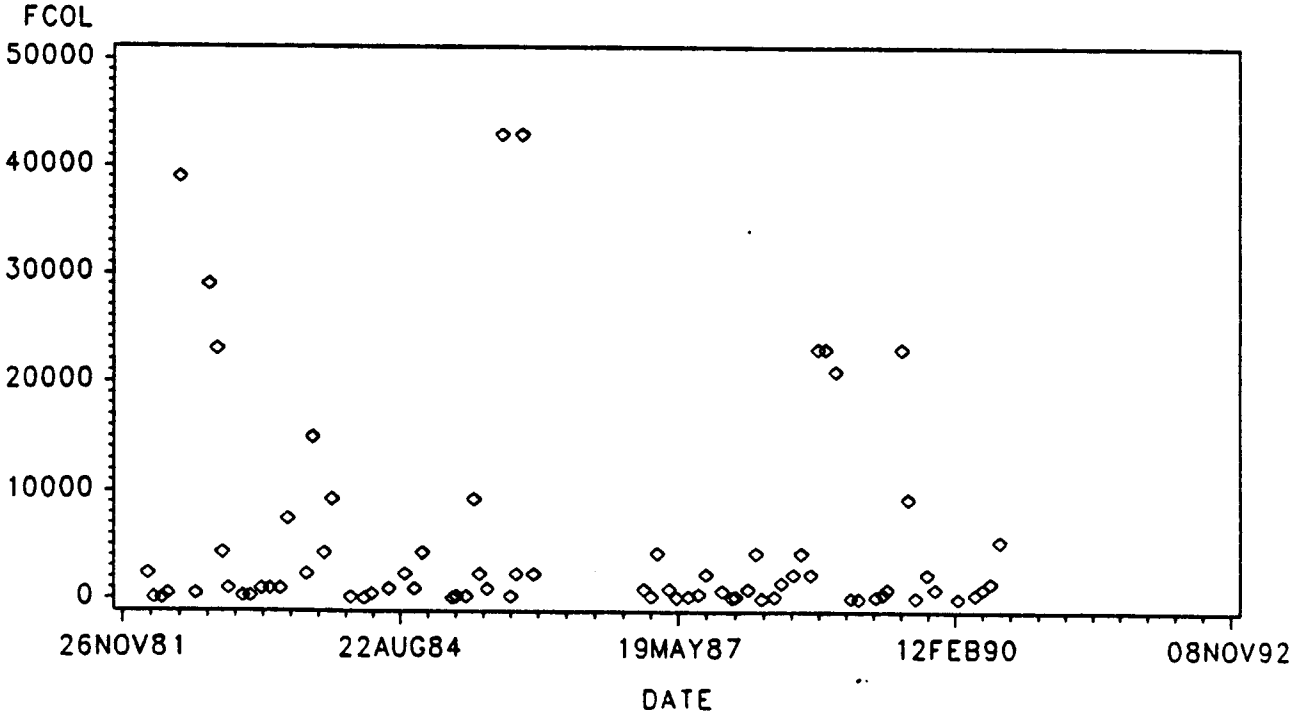
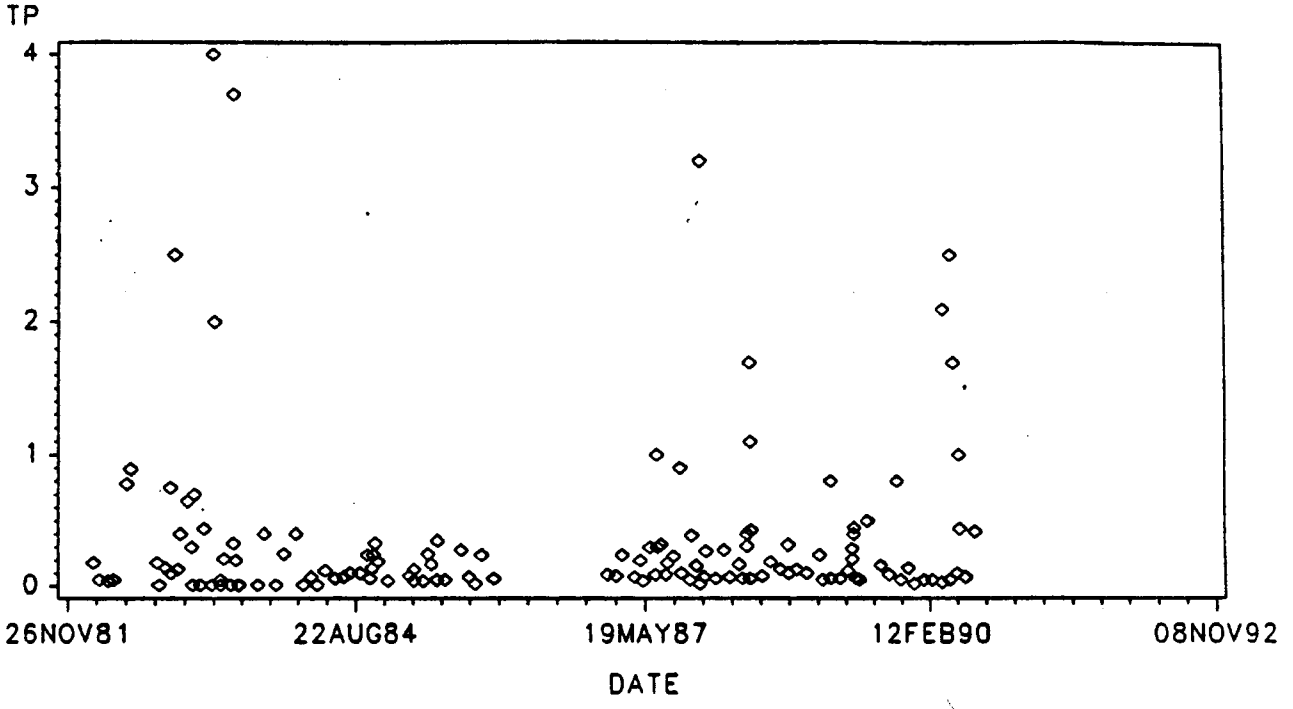


FIGURE 4: BIG PIPE CREEK AT BRUCEVILLE

TP CONCENTRATION MG/L



BIG PIPE CREEK AT BRUCEVILLE
PO4 CONCENTRATION MG/L

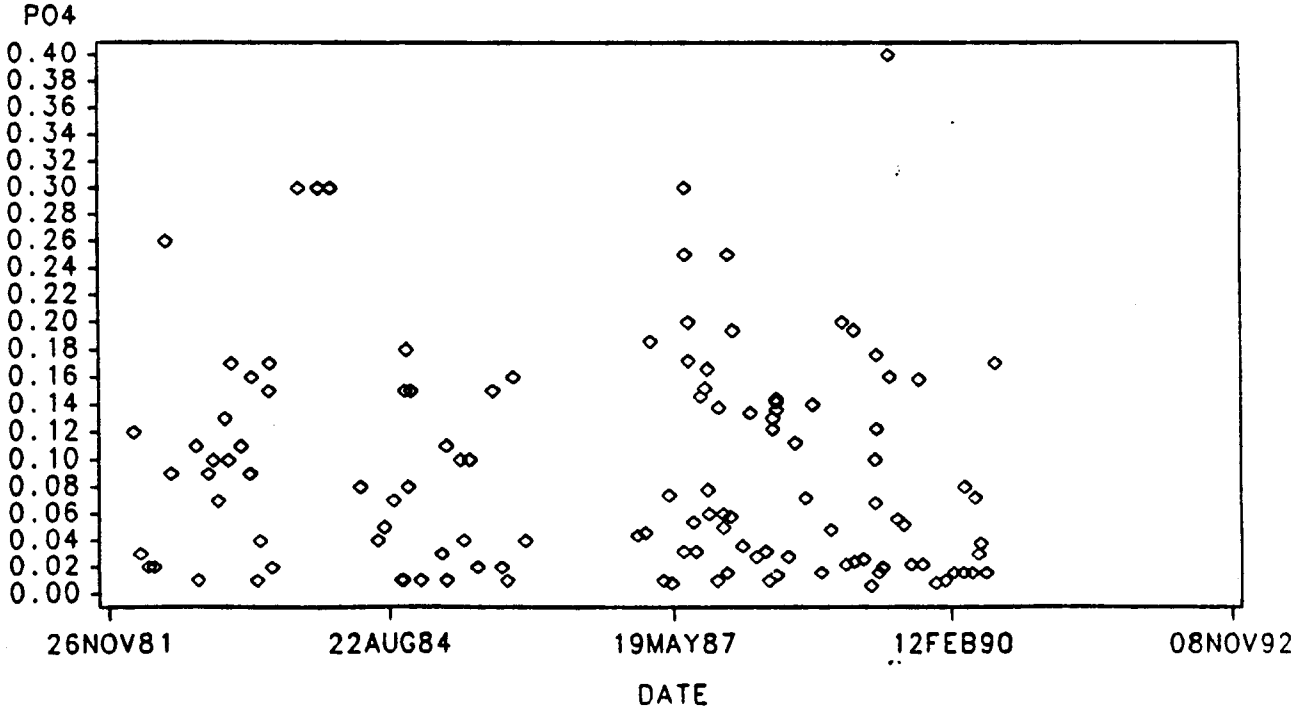
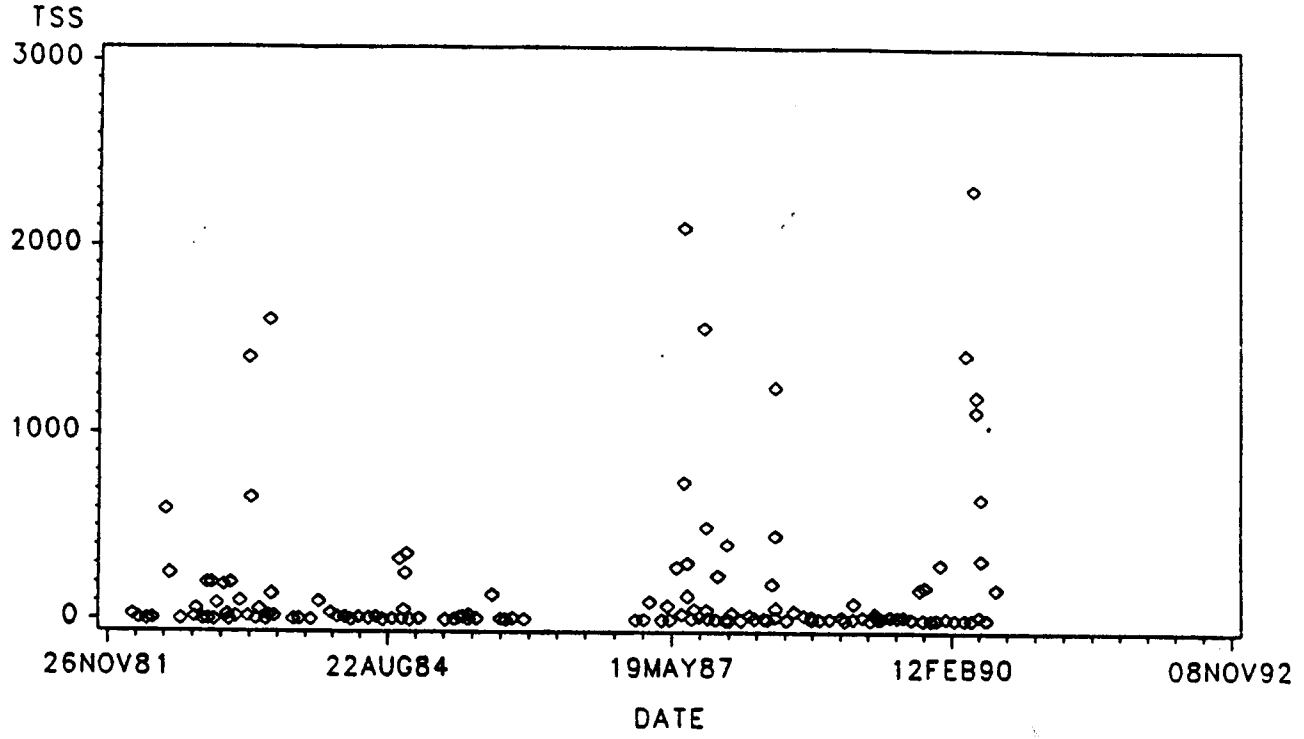


FIGURE 5: BIG PIPE CREEK AT BRUCEVILLE

TSS CONCENTRATION MG/L



BIG PIPE CREEK AT BRUCEVILLE
TOC CONCENTRATION MG/L

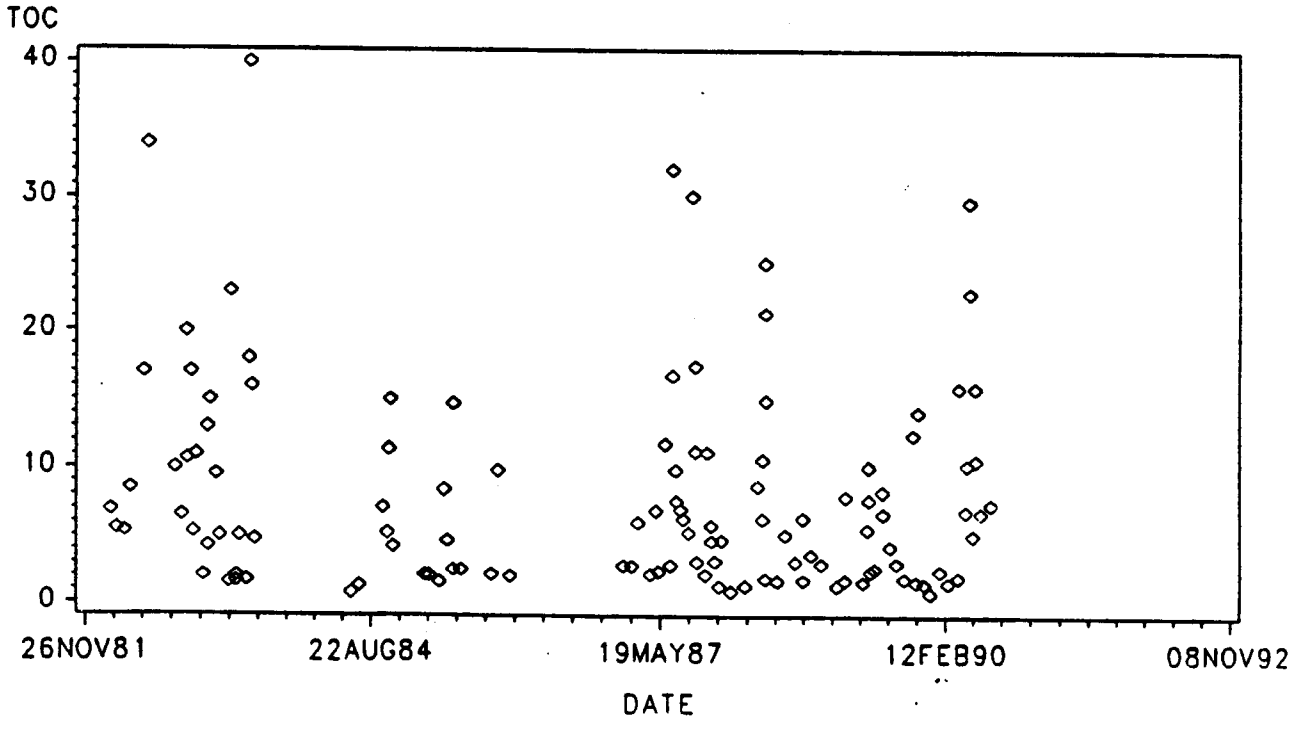
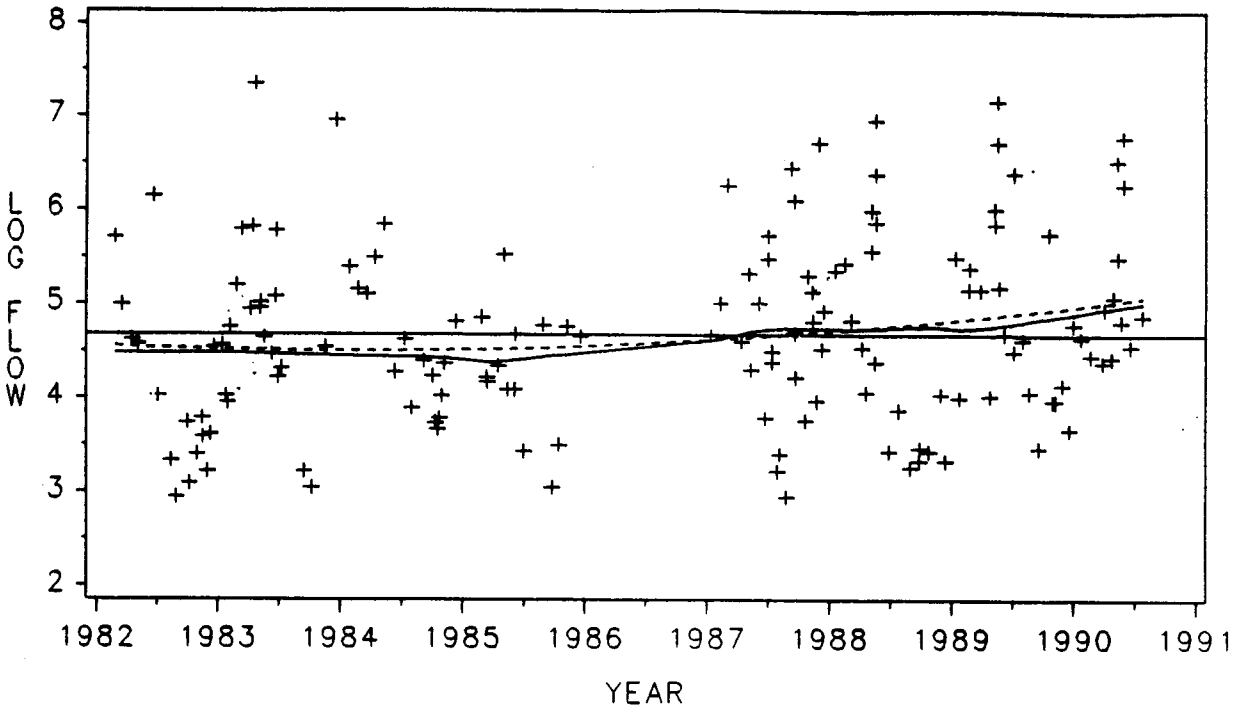


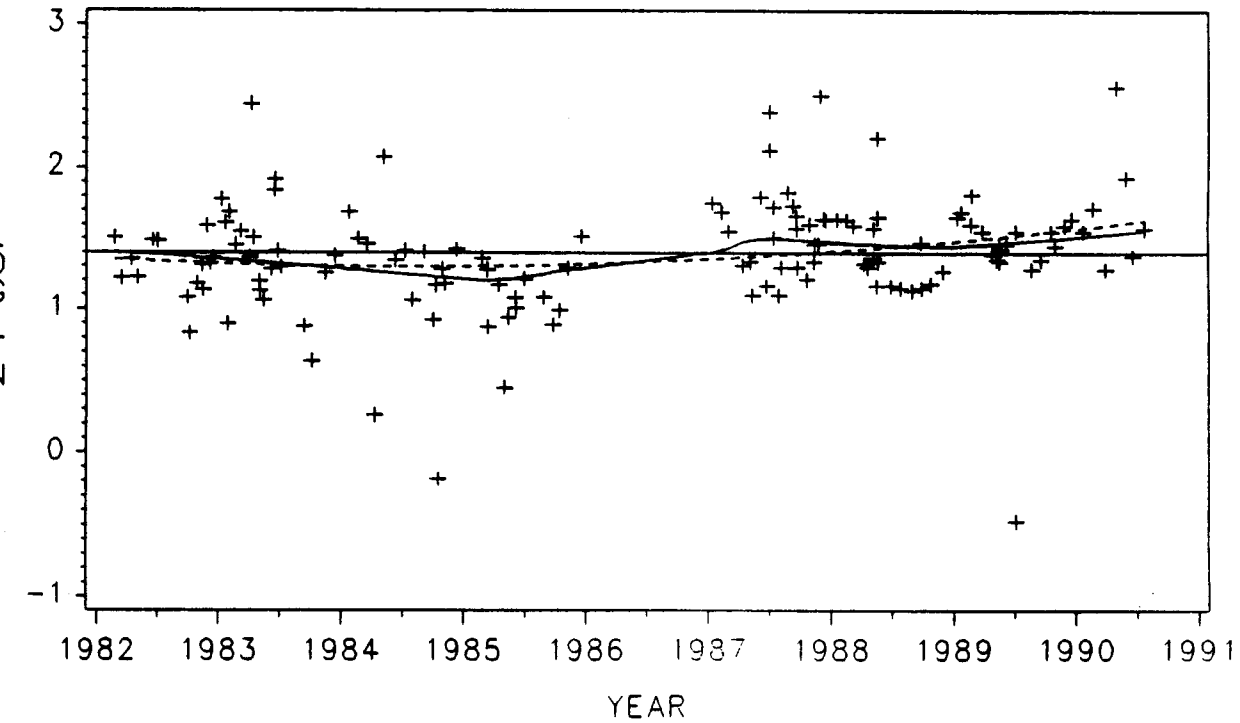
FIGURE 6: BIG PIPE CREEK AT BRUCEVILLE

TIME TREND IN LOG TRANSFORMED FLOW



_____ LOWESS SMOOTHED _ _ _ _ _ _ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG FLOW

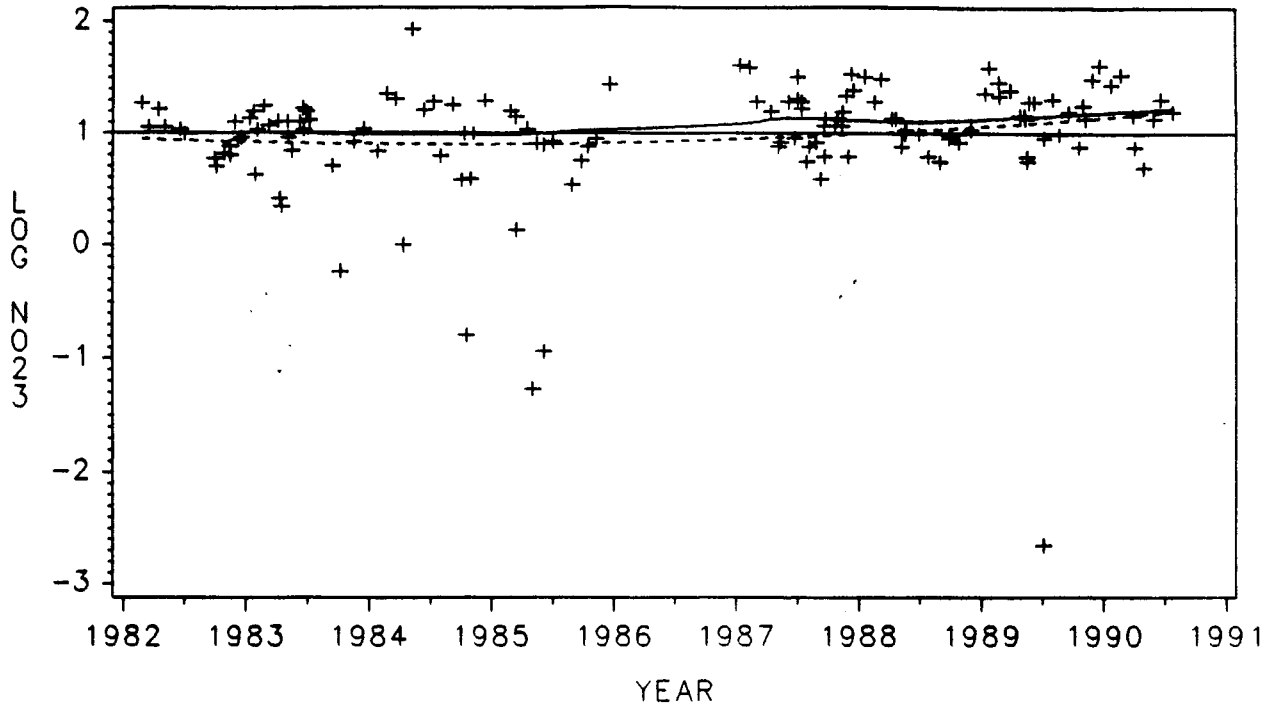
TIME TREND IN LOG TRANSFORMED TN CONCENTRATIONS



_____ LOWESS SMOOTHED _ _ _ _ _ _ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG TN

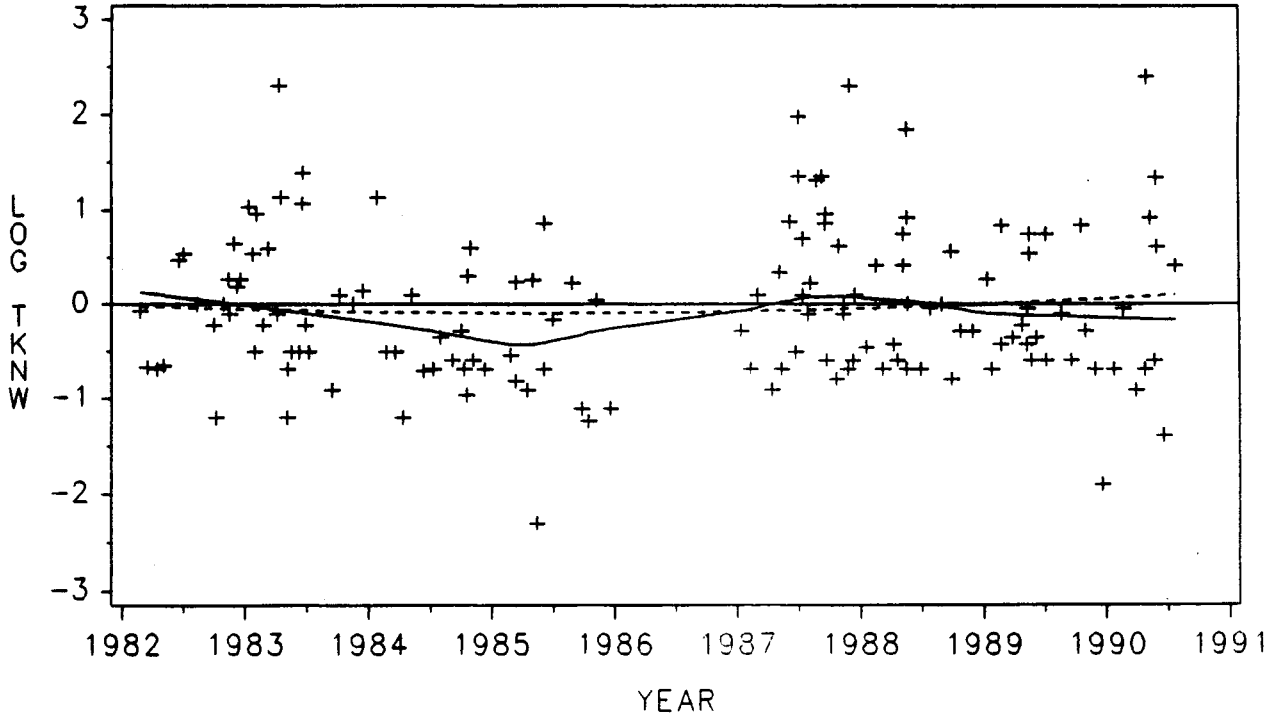
FIGURE 7: BIG PIPE CREEK AT BRUCEVILLE

TIME TREND IN LOG TRANSFORMED NO23 CONCENTRATIONS



_____ LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG NO23

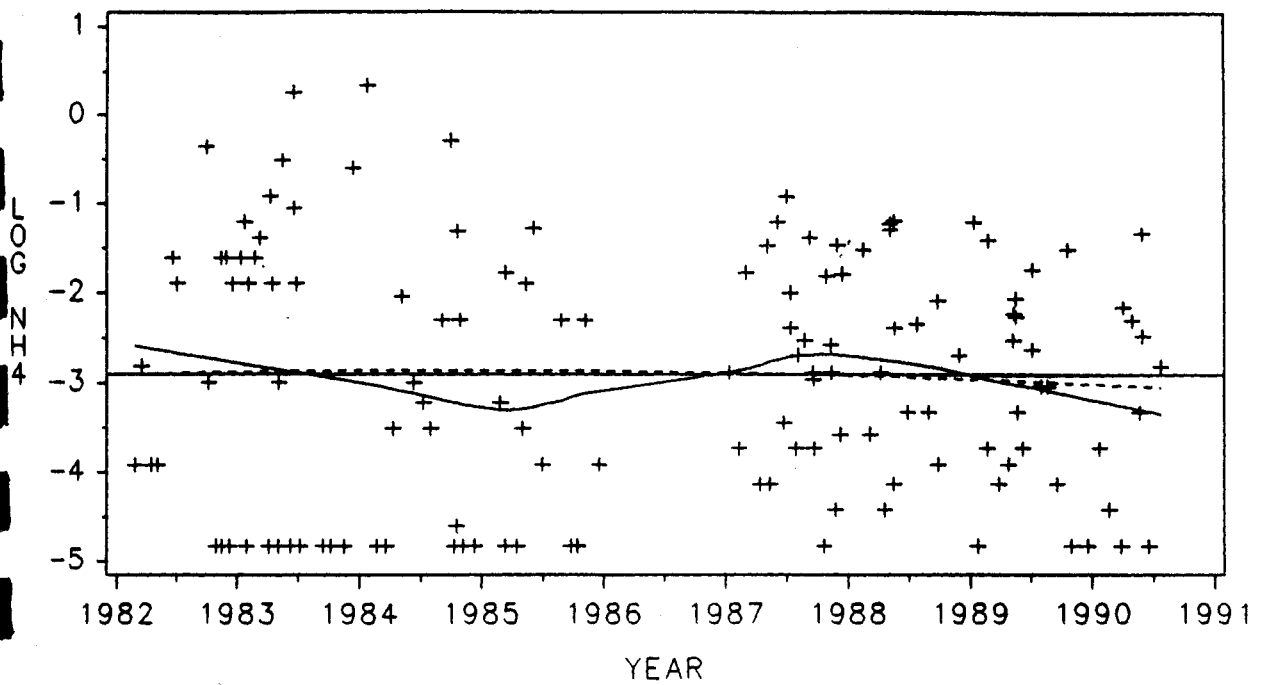
TIME TREND IN LOG TRANSFORMED TKNW CONCENTRATION



_____ LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG TKNW

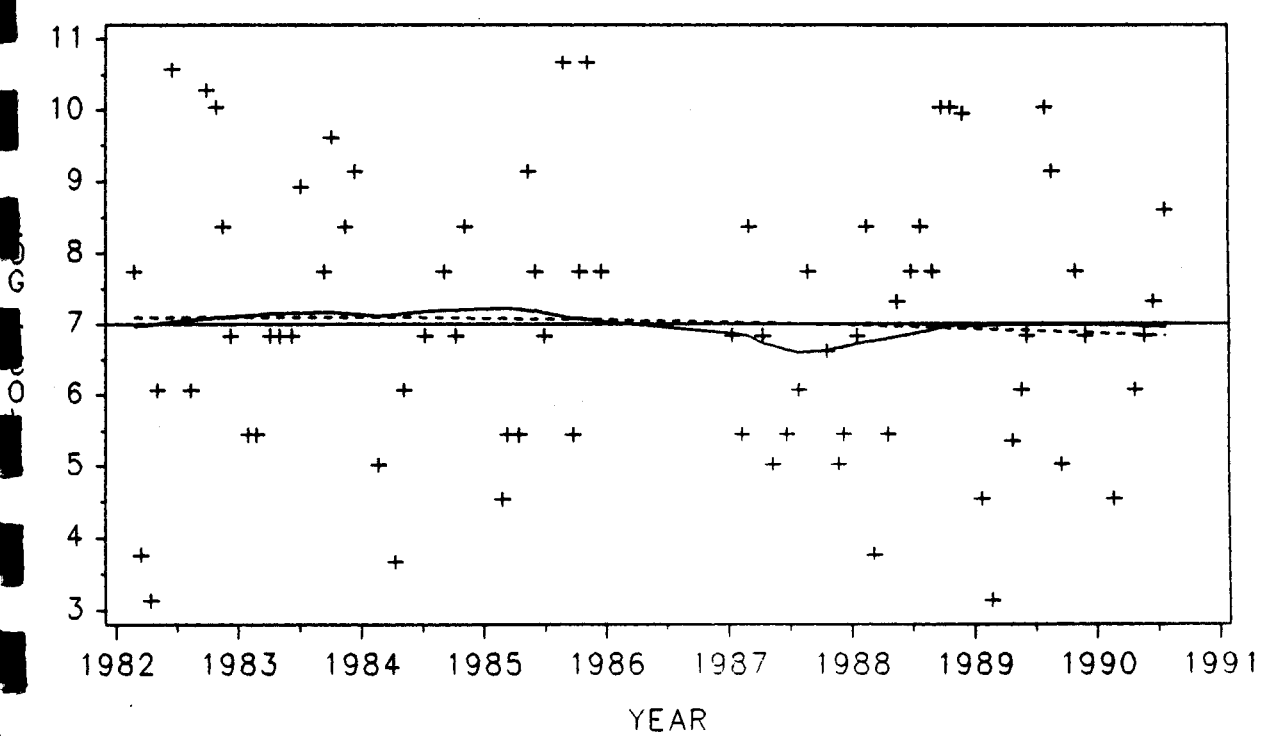
FIGURE 8: BIG PIPE CREEK AT BRUCEVILLE

BIG PIPE CREEK AT BRUCEVILLE
TIME TREND IN LOG TRANSFORMED NH4 CONCENTRATIONS



LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG NH4

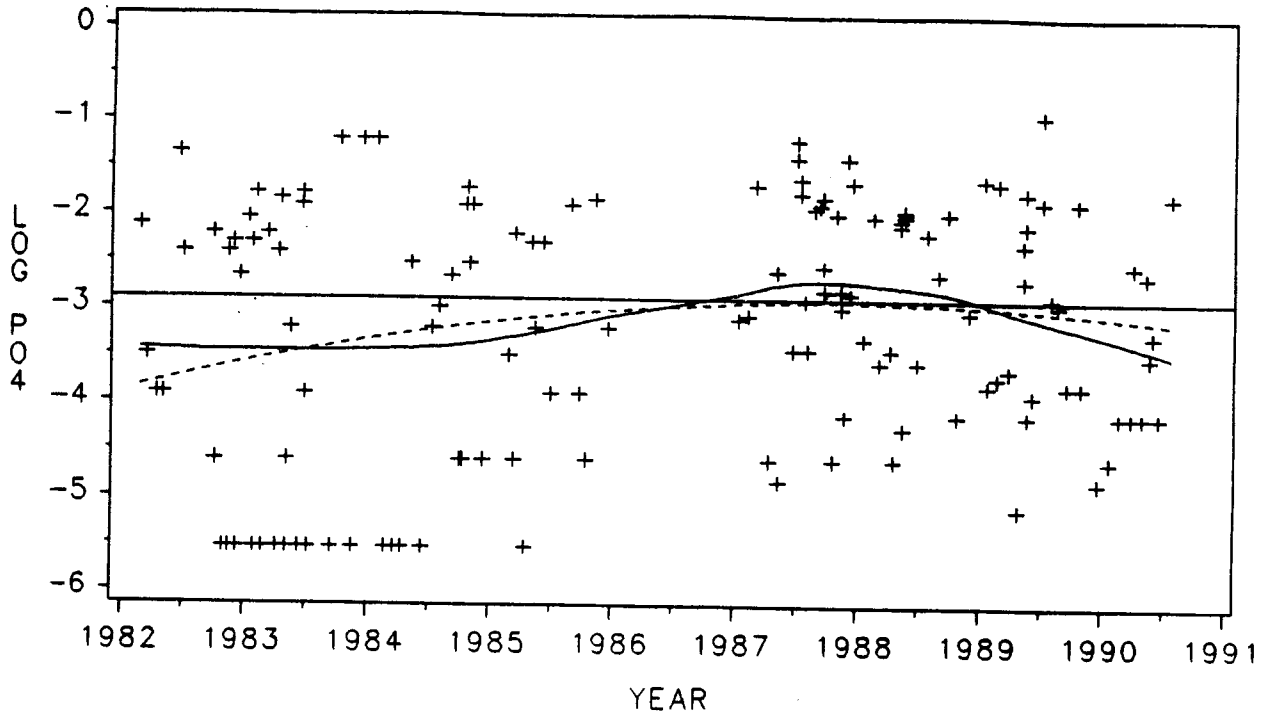
TIME TREND IN LOG TRANSFORMED FECAL CONCENTRATION



LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG FECAL

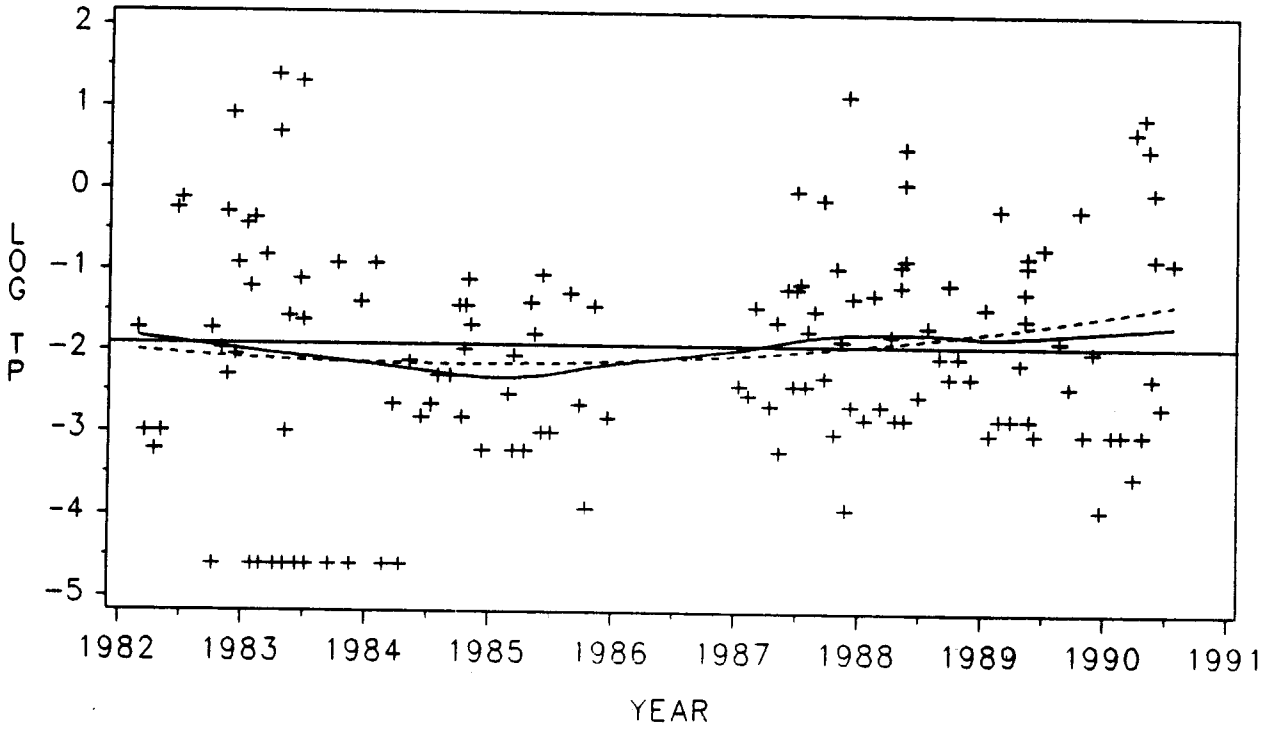
FIGURE 9: BIG PIPE CREEK AT BRUCEVILLE

TIME TREND IN LOG TRANSFORMED PO4 CONCENTRATIONS



LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG PO4

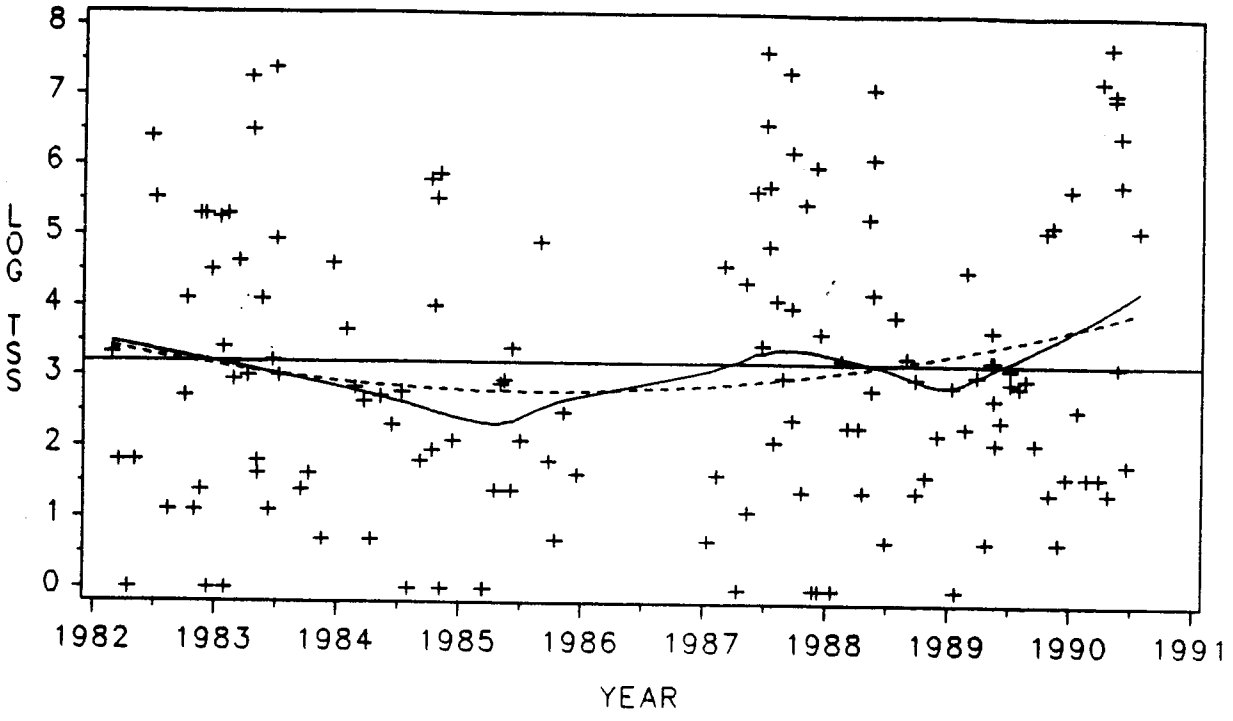
TIME TREND IN LOG TRANSFORMED TP CONCENTRATIONS



LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG TP

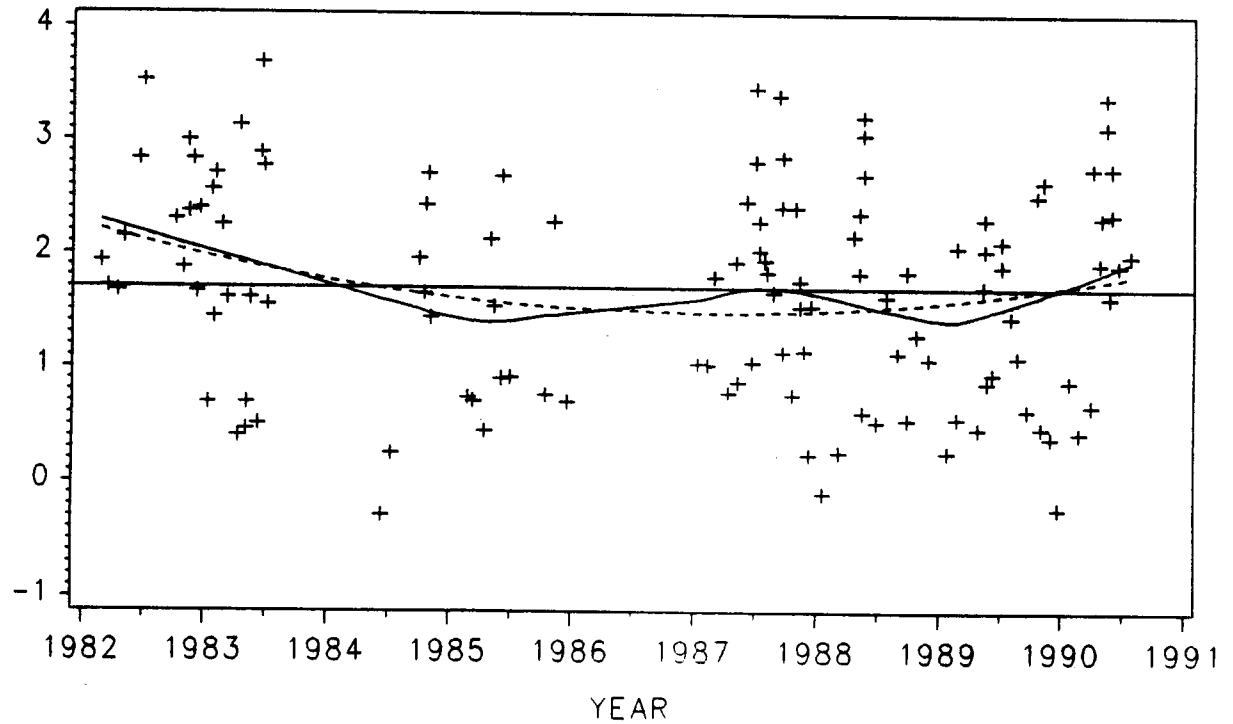
FIGURE 10: BIG PIPE CREEK AT BRUCEVILLE

TIME TREND IN LOG TRANSFORMED TSS CONCENTRATION



LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG TSS

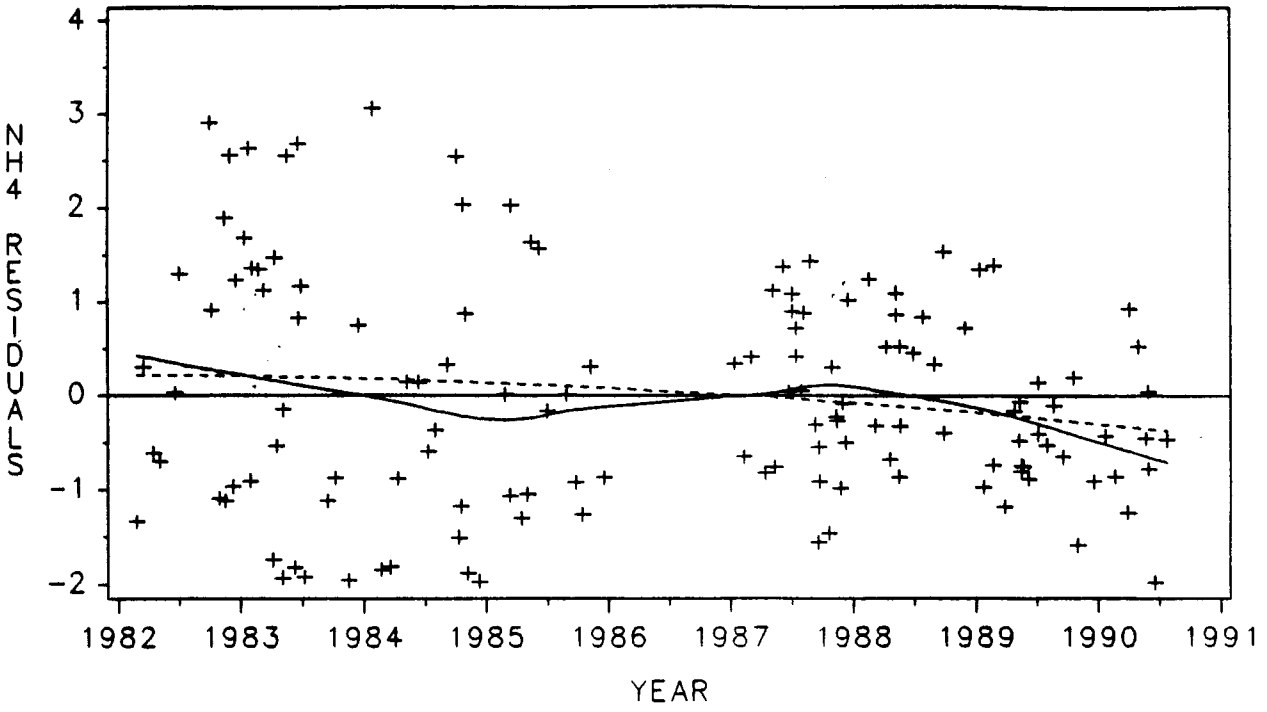
TIME TREND IN LOG TRANSFORMED TOC CONCENTRATION



LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS THE MEAN PREDICTED LOG TOC

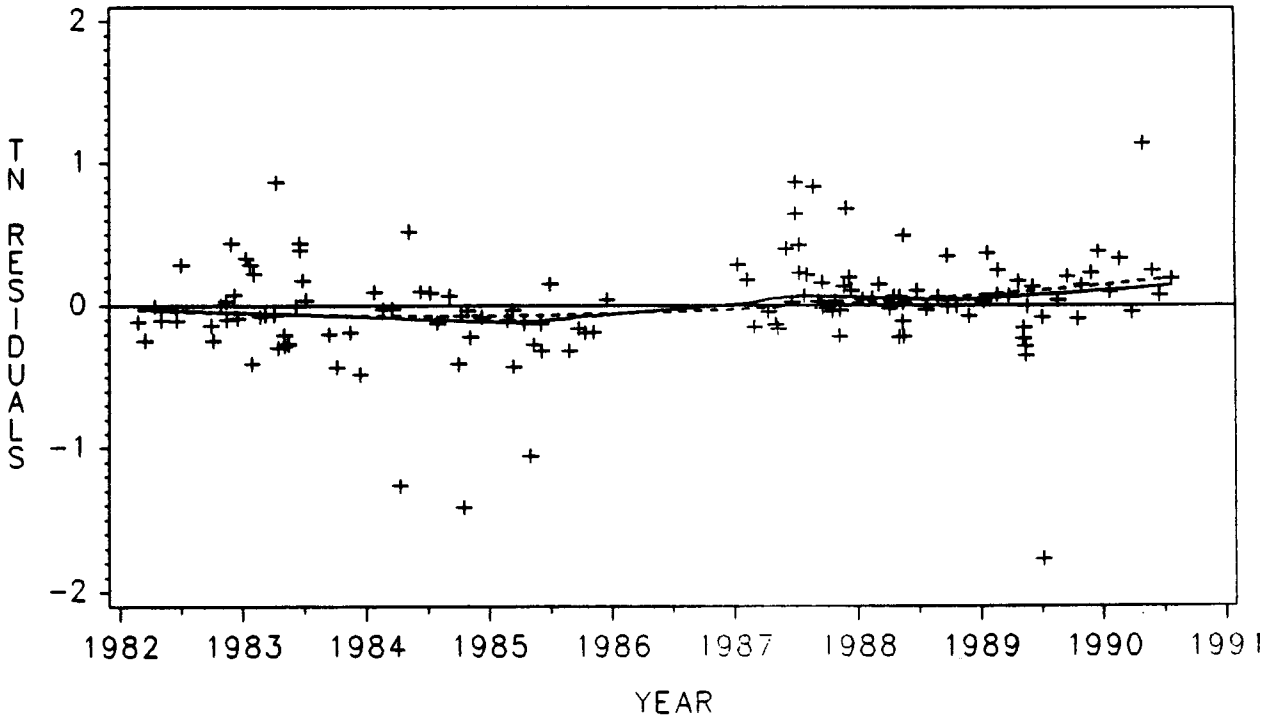
FIGURE 11: BIG PIPE CREEK AT BRUCEVILLE

TIME TREND IN STREAM FLOW AND SEASON ADJUSTED NH4 RESIDUALS



——— LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS A REFERENCE LINE

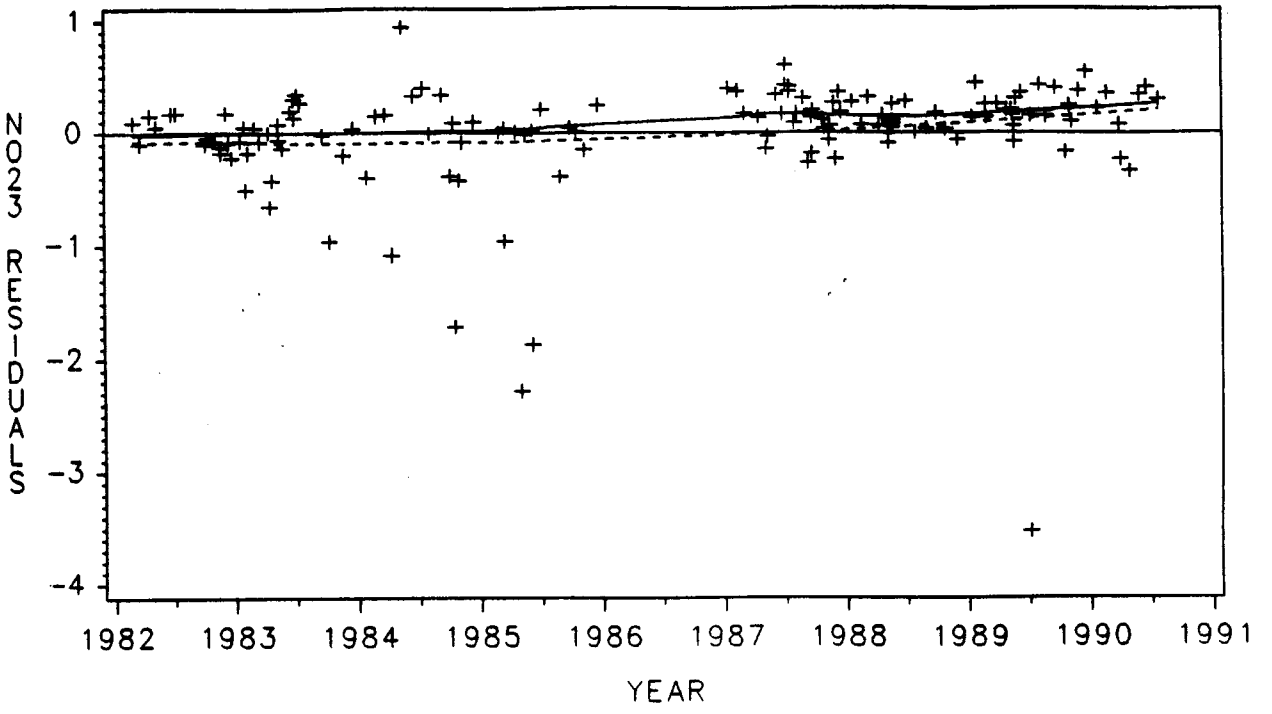
TIME TREND IN STREAM FLOW AND SEASON ADJUSTED TN RESIDUALS



——— LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS A REFERENCE LINE

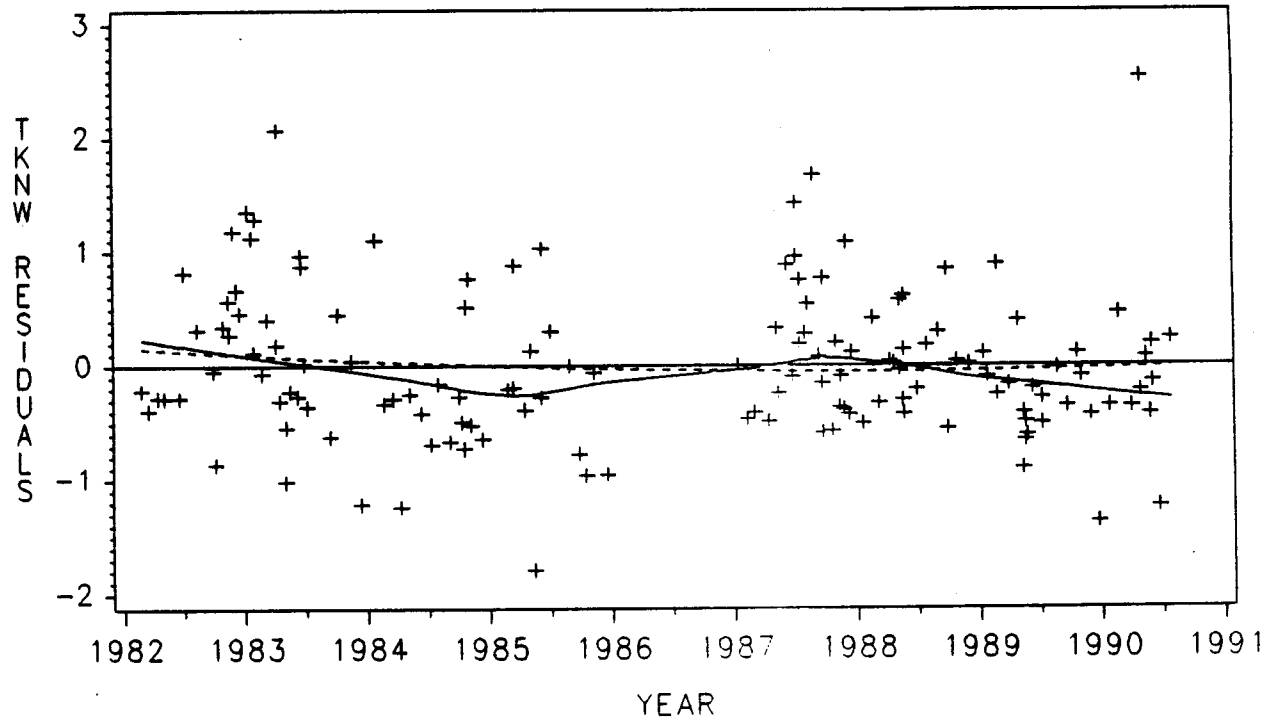
FIGURE 12: BIG PIPE CREEK AT BRUCEVILLE

TIME TREND IN RIVER FLOW AND SEASON ADJUSTED NO23 RESIDUALS



LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS A REFERENCE LINE

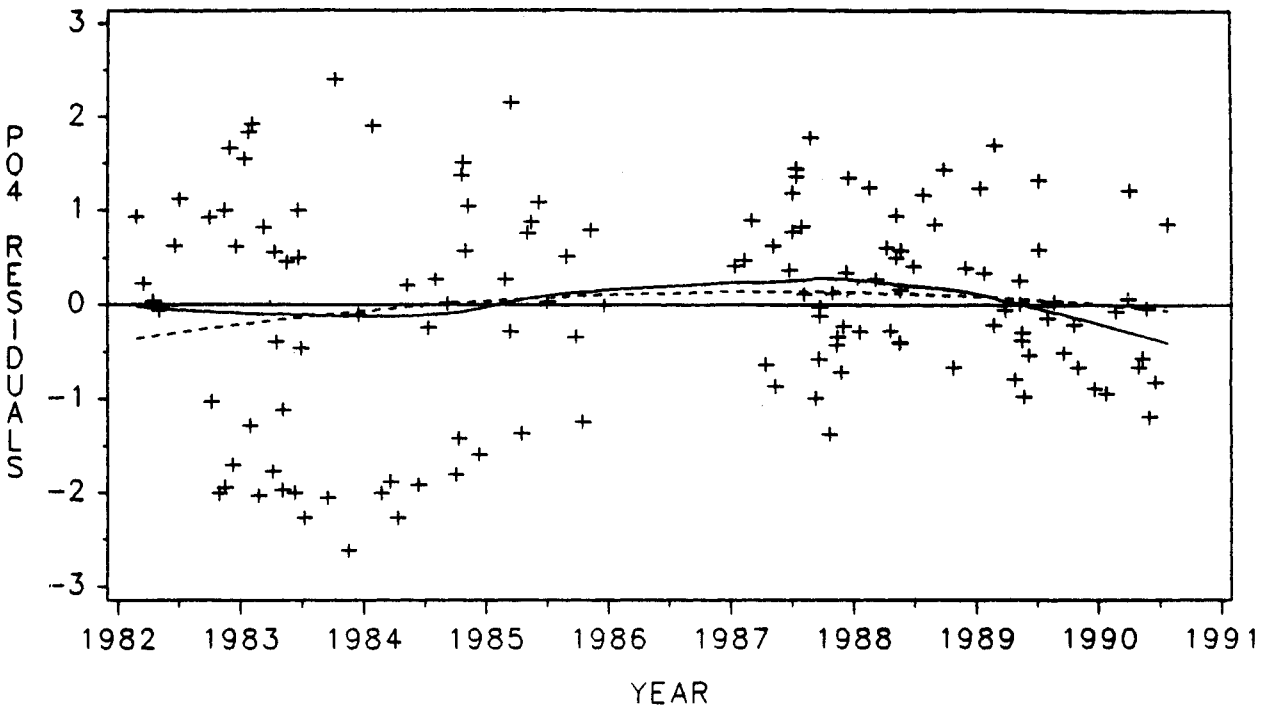
TIME TREND IN RIVER FLOW AND SEASON ADJUSTED TKNW RESIDUALS



LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS A REFERENCE LINE

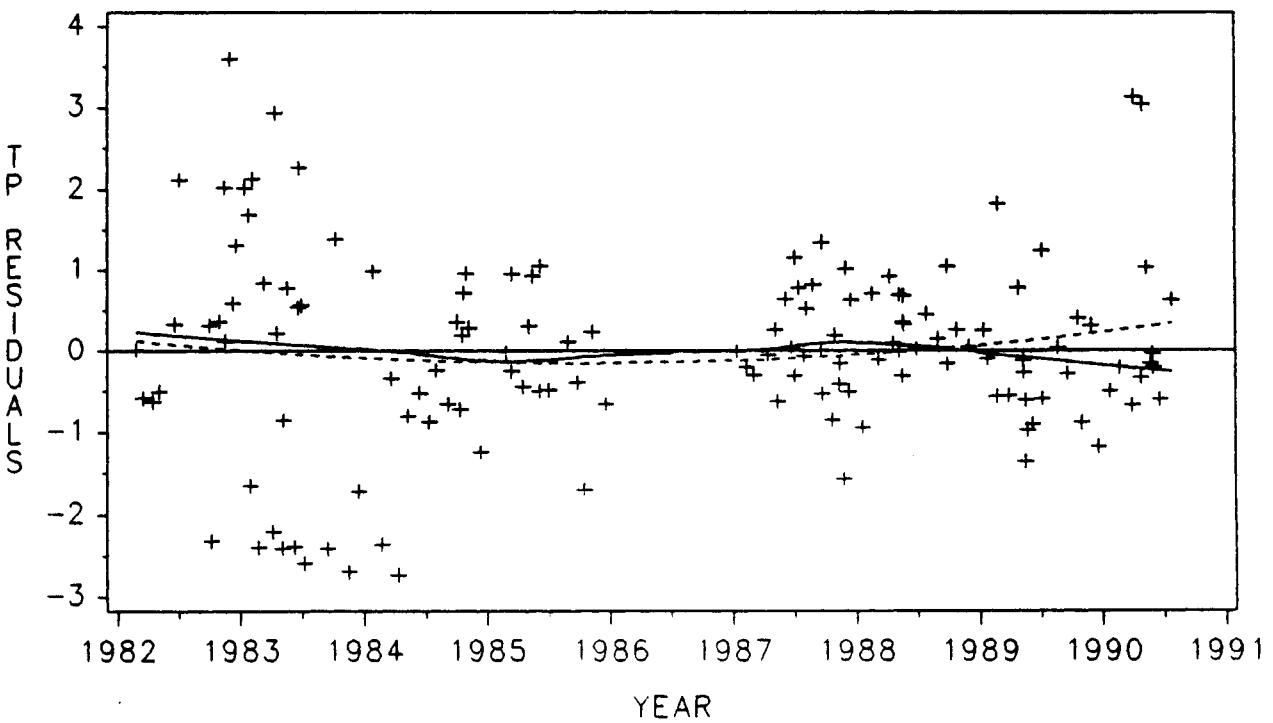
FIGURE 13: BIG PIPE CREEK AT BRUCEVILLE

TIME TREND IN STREAM FLOW AND SEASON ADJUSTED PO4 RESIDUALS



_____ LOWESS SMOOTHED _ _ _ _ _ _ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS A REFERENCE LINE

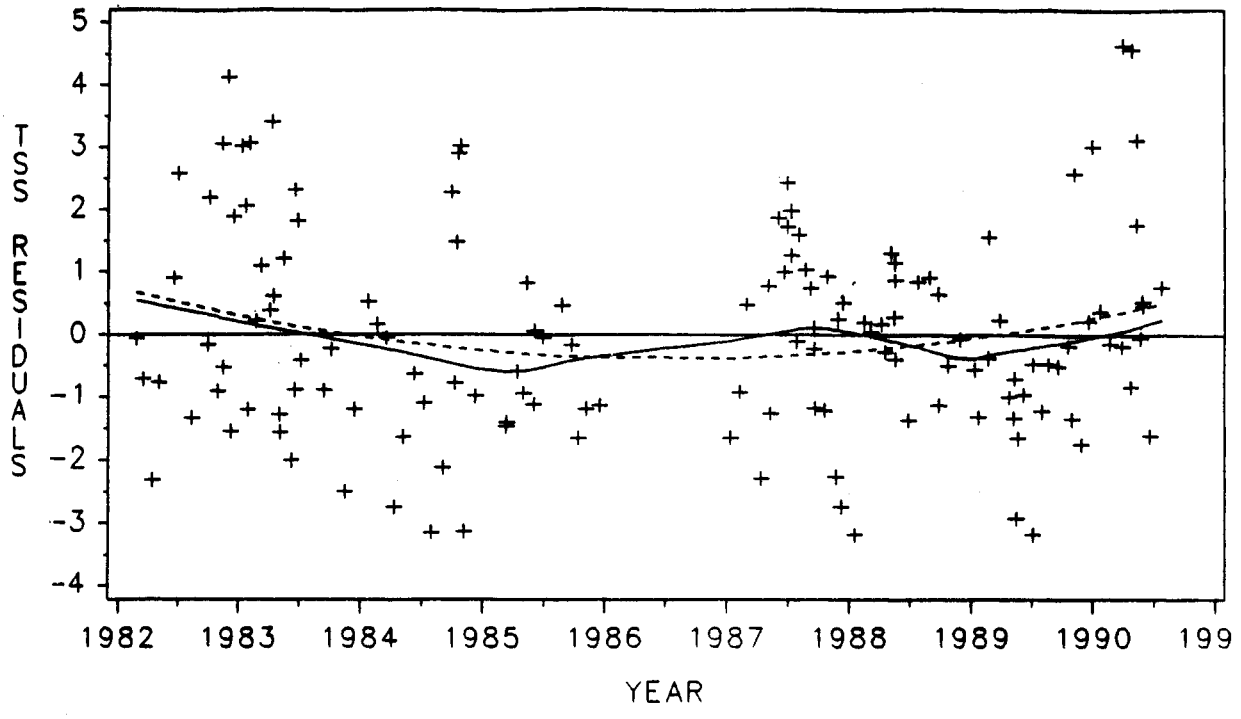
TIME TREND IN STREAM FLOW AND SEASON ADJUSTED TP RESIDUALS



_____ LOWESS SMOOTHED _ _ _ _ _ _ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS A REFERENCE LINE

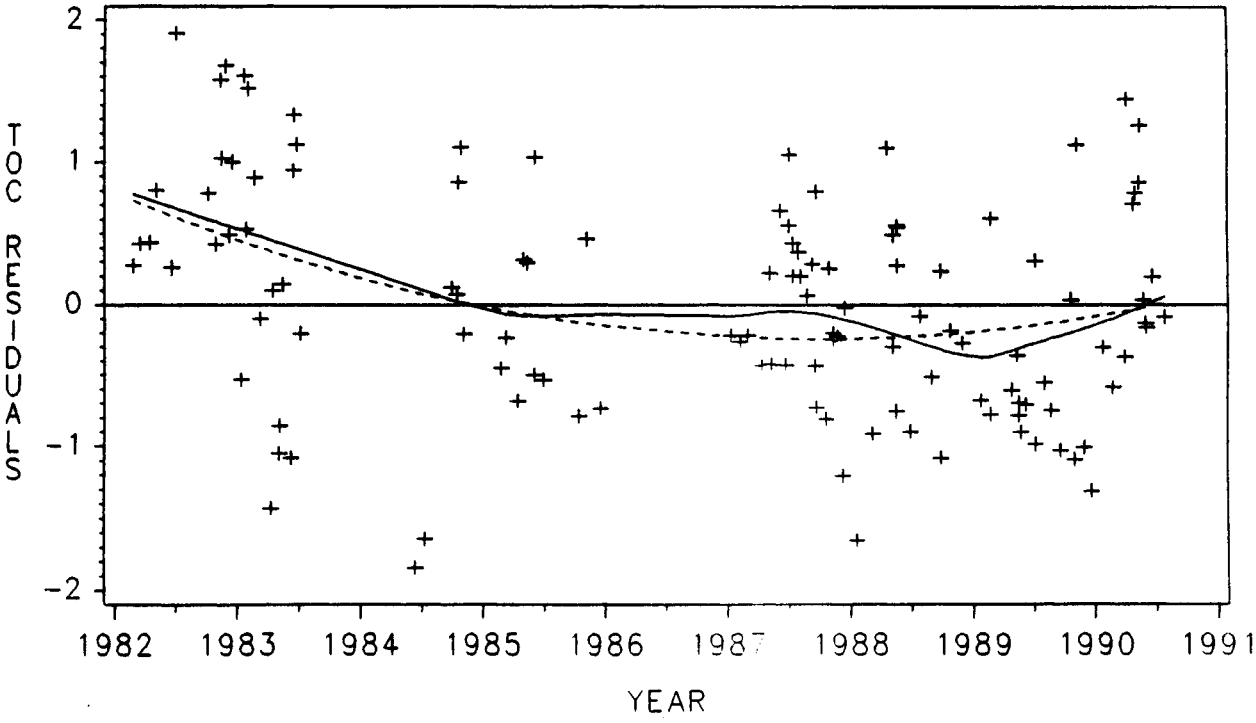
FIGURE 14: BIG PIPE CREEK AT BRUCEVILLE

TIME TREND IN RIVER FLOW AND SEASON ADJUSTED TSS RESIDUALS



——— LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS A REFERENCE LINE

TIME TREND IN STREAM FLOW AND SEASON ADJUSTED TOC RESIDUALS



——— LOWESS SMOOTHED _____ QUADRATIC REGRESSION
SOLID STRAIGHT LINE IS A REFERENCE LINE

FIGURE 15: BIG PIPE CREEK AT BRUCEVILLE

TIME TREND IN RIVER FLOW AND SEASON ADJUSTED FECAL RESIDUALS

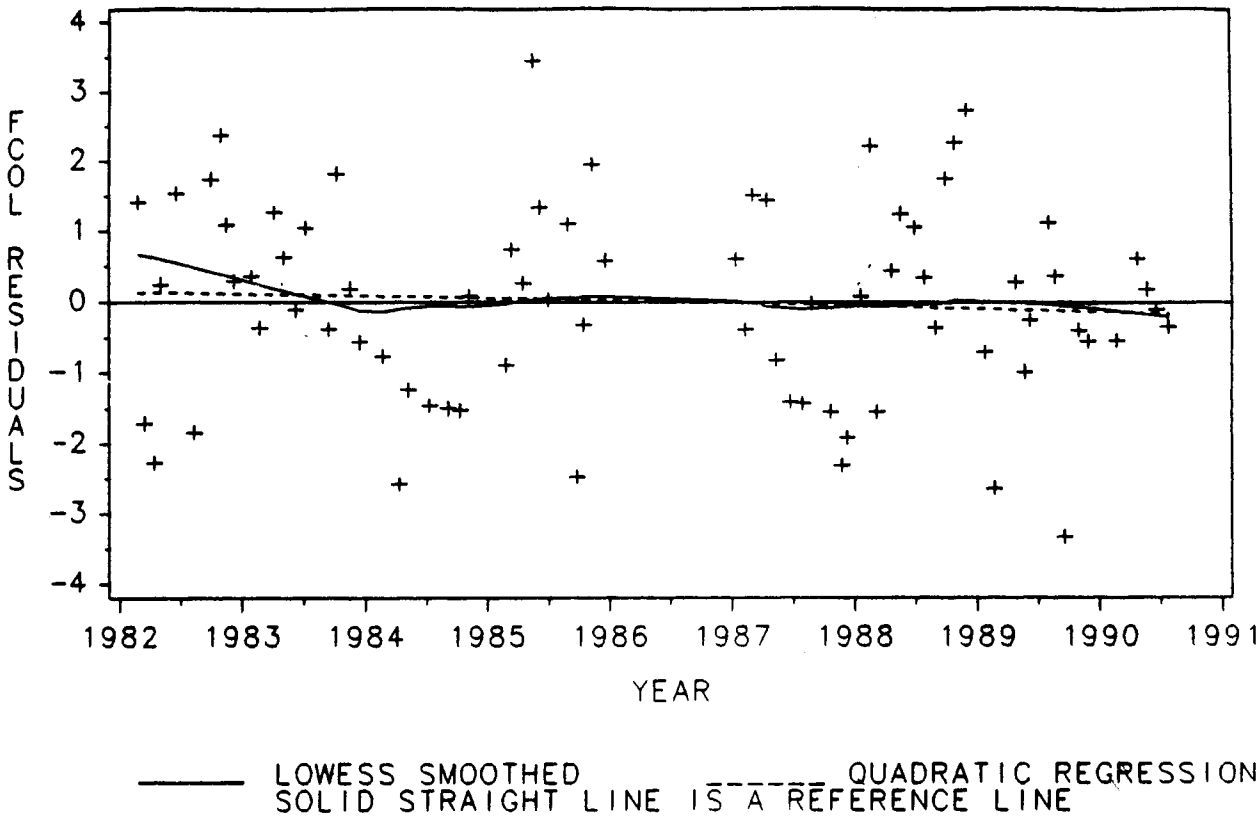
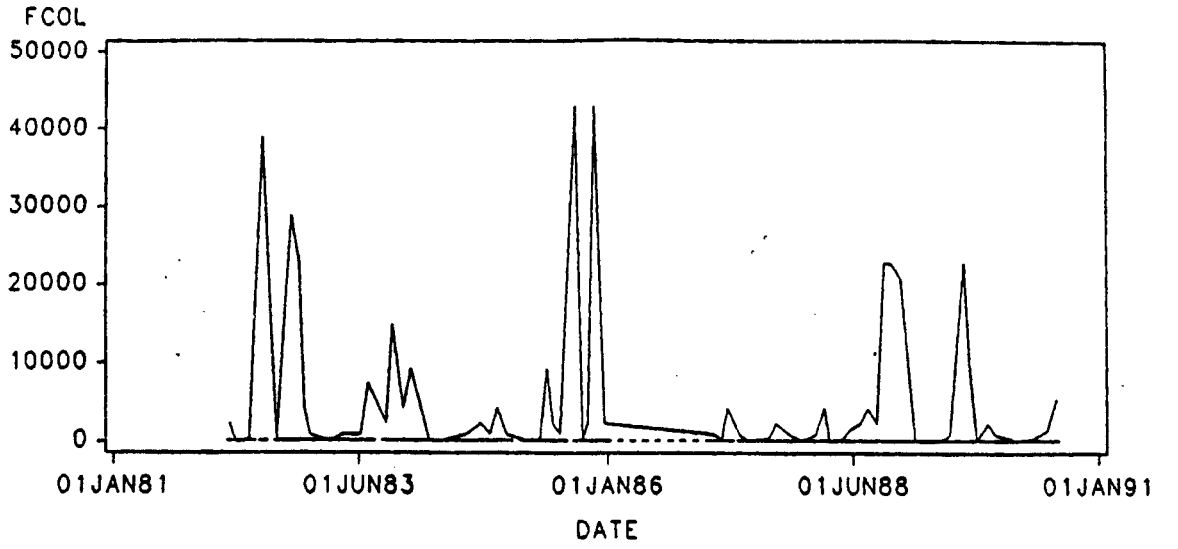


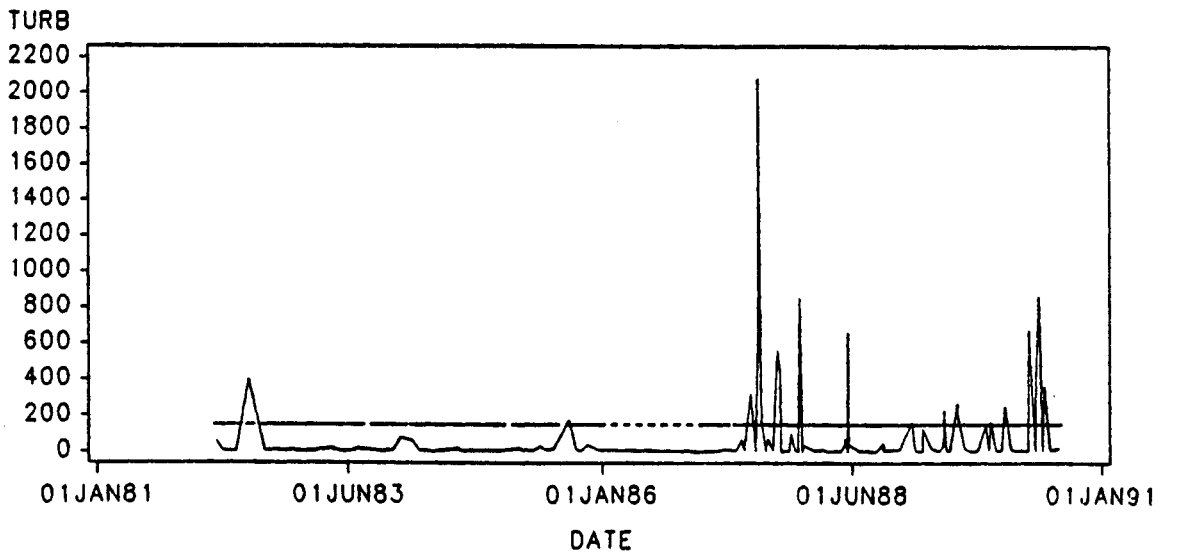
FIGURE 16:
BIG PIPE CREEK AT BRUCEVILLE
FECAL COLIFORM MPN/ 100 ML



---------- FECAL

. . . . . STATE STANDARD 200 MPN/100 ML

FIGURE 17:
BIG PIPE CREEK AT BRUCEVILLE
TURBIDITY NTU



---------- TURB

. . . . . STATE STANDARD 150 NTU

DISCUSSION

The project established two specific quality goals. The first goal was to meet the State's water quality standards for fecal coliform at all times. The State water quality standard for fecal coliform is 200 MPN/ 100 ml, based on a minimum of five samples taken within a 30 day period. Ten percent of the samples taken during the 30 day period may not exceed 400 MPN/100 ml. (COMAR 28.06.02).

Figure 16 shows the fecal coliform data collected during this study and a reference line at the 200 MPN/ 100 ml level. The majority of the data collected during the study was above 200 MPN/ 100ml. Seventy one percent of the samples collected during this study exceeded 400 MPN/ 100 ml. The data indicate that the fecal coliform standards are regularly exceeded in the creek.

The BMPs implemented by this project were designed to manage manure and reduce soil erosion. None of the BMPs used in association with this project appear to have been effective in reducing fecal coliform densities in Big Pipe Creek. Additional work is required to determine what practices are effective in reducing fecal coliform densities.

The second specific water quality goal of the project was to meet the State's water quality standard for turbidity at all times. The State standard for turbidity states that "Turbidity in the surface water resulting from any discharge may not exceed 150 units at any time or 50 units as a monthly average." (COMAR 28.06.02). The units of measurement may be NTU, JTU, or FTU. Between 1982 and 1990 the turbidity in Big Pipe Creek exceeded the State standard on several occasions (Figure 17).

The problem with using the turbidity water quality standard as a measure of nonpoint source pollution is that it was developed to be applied to point sources. Turbidity is closely associated with the concentration of suspended solids in a stream. As has been shown (Figure 5), there is considerable variation in the concentration of total suspended solids in Big Pipe Creek. The variation in instream suspended solids concentrations is dependant on flow, land use, rain fall intensity, antecedent moisture, and a number of other factors. The application of this standard during storm events always produces sub-standard results. Since this standard was not designed for application to nonpoint source pollution, the selection of the State's turbidity standard was an inappropriate objective for this project.

The more general goal of this project was to improve water quality. In order to assess the degree of expected change in water quality, the magnitude of change that has resulted for the land treatment needs to be estimated. During the period, 1982 through 1990, the RCWP and the farmers in the basin invested approximately $3,400,000 in best management practices. The RCWP program's investment in the basin is approximately $2,700,000.

The installation of BMPs in the basin resulted in an estimated reduction of infield soil erosion from cropland of 25,646 tons per year and the storage of 99,919 tons of manure per year by 1989. Based on an average erosion rate of 9.6 tons of soil per acre of cropland for the basin, the net reduction of in field soil erosion from cropland is approximately 4%. Based on the livestock population numbers for 1989 the net quantity of manure stored increased by 28% (Table 45). The reduction in soil erosion and the increase in manure stored can be converted into pounds of nitrogen (N) and phosphorus (P) using the conversion factors of 1.1 lbs of P/ton and 5.4 lbs of N/ton for soil and 1.3 lbs of P/ton and 7.0 lbs of N/ton for manure (EPA 1987). The net reduction of nutrients available from eroded soil and manure as a result of the implementation of BMPs was 13% for both N and P.

Table 45: Manure, soil, and nutrient savings resulting from Double Pipe Creek RCWP implementation.

	TOTAL (tons/yr)	NUTRIENT EQUIVALENT (tons/yr)		REDUCTION (tons/yr)	NUTRIENT EQUIVALENT (tons/yr)		%REDUCTION	
		N	P		N	P	N	P
MANURE	361,228	1264	235	99,919	350	65	28	28
SOIL	696,960	1882	383	25,646	69	14	4	4
TOTAL		3146	618		419	79	13	13

The water quality results to date indicate that during the period from 1982 through 1990, NH4 and TOC concentrations decreased with time. Based on the predicted values from the regression of the flow and season adjusted residual against time, ammonia concentrations have decreased 44% and total organic carbon concentrations have decreased 51% over the period.

The decreasing trends in NH4 and TOC concentrations are encouraging. The trends indicate that some of the more mobile forms of nutrients and organic matter may be getting held up in the system. This may be the result of the land treatment sponsored by the Double Pipe Creek RCWP. The project increased the storage of animal waste in the basin by

approximately 99,919 tons/yr and decreased the quantity of N and P readily available from manure for transport to the stream system by 28%. The trends may indicate that less manure is being washed off the land surface, since NH4 and TOC are major constituents in manure runoff.

It has been estimated that the project has reduced the quantity of nutrients available for export from soil erosion and manure application in the basin by approximately 13% (Table 45). The 13% reduction has not shown up in the PO4 and TP constituent trends because the 13% change is too slight to be statistically detected given the large natural variability in PO4 and TP concentrations with changes in river flow. PO4 and TP are more generally associated with soil erosion and sediment transport, and are thus more influenced by storm events then NH4 and TOC, making trends much more difficult to detect.

Similarly it has been estimated that the project has reduced soil erosion by only 4%. This reduction has not shown up in TSS constituent trends because the magnitude of the change is to small to be statistically detected given the variability of TSS concentrations with storm events.

The increasing trend in nitrate-nitrite nitrogen (NO23), which leads to a corresponding increase in TN, indicates that the soluble forms of N are leaching through the system. A variety of factors are probably contributing to the observed increase in NO23. The increased use of conservation tillage in the region over the last 15 years may have increased infiltration and thus increased the leaching of soluble chemicals into the groundwater. The increased storage of animal waste reduces nitrogen loses to the atmosphere and to streams through direct runoff. However, storage of animal waste does result in more manure being applied to fields, which increases the potential for leaching. The proper timing of manure applications and the incorporation of applied manure also reduces atmospheric loses of nitrogen and increases the quantity of nitrogen being applied. Increased atmospheric deposition of nitrogen and increasing numbers of residences with septic systems also contribute to the nitrogen load increases.

FUTURE WORK

The water quality monitoring program is scheduled to continue until the end of 1992. Water quality monitoring at the Lease site may extend into 1993 depending on the implementation schedule for BMPs. The 15 year report for the Double Pipe Creek RCWP will include a trend analysis for the period 1982 through 1992 and the "Before/After" study of BMP effectiveness at the Lease site.

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BIG PIPE CREEK - Subwatershed of Double Pipe Creek Project

BMP's COMPLETED

CONTRACT NUMBER	BMP-1 acres	BMP-2 number	BMP-3 acres	BMP-5 feet	BMP-6 number	BMP-7 feet	BMP-10 number	BMP-11 acres	BMP-12 number	BMP-15 acres	BMP-16 acres
2						X					
5		X									
6		X	X			X				X	X
12		X			X	X	X				
14			X		X	X					
15	X	X			X	X					
18		X									
19		X							X		
26		X				X					
27		X			X	X	X				
29		X				X	X				X
30		X		X		X					
31		X				X					
32		X	X	X	X	X					
33		X		X						X	X
34		X	X								
35		X	X					X			
39		X								X	X
45		X			X	X					
48						X					
49								X			
52		X									
54		X		X	X	X		X			
55		X				X					
56					X	X					
57		X				X					
59					X	X					

BIG PIPE CREEK - Subwatershed of Double Pipe Creek Project continued...

CONTRACT NUMBER	BMP-1 acres	BMP-2 number	BMP-3 acres	BMP-5 feet	BMP-6 number	BMP-7 feet	BMP-10 number	BMP-11 acres	BMP-12 number	BMP-15 acres	BMP-16 acres
63		X		X	X	X	X				
64			X		X	X					
65		X		X		X					
66		X	X		X	X					
67		X			X	X					
74		X	X	X	X	X	X				
75						X	X				
76		X			X		X				
78		X				X					
79						X					
80						X					
89	X	X		X	X	X	X			X	X
90						X					
91		X			X	X					
92			X	X	X						
93					X	X		X			
99		X			X	X					
104		X			X	X					
105					X	X					
106			X			X					
108						X		X			
109						X					
115			X								
116			X			X	X	X			
117					X		X				

BIG PIPE CREEK - Subwatershed of Double Pipe Creek Project continued...

CONTRACT NUMBER	BMP-1 acres	BMP-2 number	BMP-3 acres	BMP-5 feet	BMP-6 number	BMP-7 feet	BMP-10 number	BMP-11 acres	BMP-12 number	BMP-15 acres	BMP-16 acres
121						X					
123	X			X		X					
127		X									
128		X		X				X		X	
130		X			X	X				X	X
131										X	X
134			X	X	X	X				X	X
135		X		X	X					X	X
142		X				X				X	X
144		X					X			X	X
145					X	X					X

Attachment #1
Sheet #4

WEST BRANCH PATAPSCO (North) - Subwatershed of Double Pipe Creek Watershed Project

CONTRACT NUMBER	BMP-1 acres	BMP-2 number	BMP-3 acres	BMP-5 feet	BMP-6 number	BMP-7 feet	BMP-10 number	BMP-11 acres	BMP-12 number	BMP-15 acres	BMP-16 acres
10		X				X					
36		X			X	X		X			
86						X					
101		X									X
114		X									

LITTLE PIPE CREEK - Subwatershed of Double Pipe Creek Project continued...

CONTRACT NUMBER	BMP-1 acres	BMP-2 number	BMP-3 acres	BMP-5 feet	BMP-6 number	BMP-7 feet	BMP-10 number	BMP-11 acres	BMP-12 number	BMP-15 acres	BMP-16 acres
82					X	X					
83			X	X	X	X				X	X
84		X									
85			X		X	X					
87					X	X					
88			X		X	X					
94		X			X	X				X	X
96		X		X		X					
97					X	X					
98			X			X					
107	X				X	X					
110	X		X			X					
111			X			X					
118					X	X					
119		X			X	X				X	X
120		X			X	X				X	X
122		X			X	X					
124	X	X					X	X			
125						X				X	X
126		X				X				X	X
129	X		X			X				X	X
133		X						X		X	X
136		X		X		X				X	X
137		X				X				X	X
138					X	X		X			
148	X		X			X	X			X	X
149							X			X	X

LITTLE PIPE CREEK - Subwatershed of Double Pipe Creek Project

CONTRACT NUMBER	BMP-1 acres	BMP-2 number	BMP-3 acres	BMP-5 feet	BMP-6 number	BMP-7 feet	BMP-10 number	BMP-11 acres	BMP-12 number	BMP-15 acres	BMP-16 acres
1		X			X						
3		X		X	X	X	X				
7		X				X					
8		X				X					
11		X		X	X	X					
13		X	X			X					
16		X									
17		X			X						
20		X				X					
23		X			X	X					
28		X				X					
38		X	X		X	X					
41			X	X	X	X					
42		X			X	X					
44	X		X			X					
46						X		X			
50					X	X					
51				X		X					
53		X	X		X						
58		X			X				X		
61		X									
68		X		X		X					
69						X					
70	X	X			X	X	X			X	X
71				X		X				X	X
73		X			X	X			X		
81			X		X	X					

RCWP QUESTIONNAIRE RESPONSES

Question 1 Do you feel your RCWP plan properly addressed your water quality improvement needs? Why or Why not?

Yes, it helped us build proper storage for liquid manure.

Some waterways have helped others need more tile to get some of the wet spots. Where the cattle cross a waterway next to the barn, the stone (a pain for the cows' feet) are gone and a deep mud hole is starting again. I feel the contour strips will greatly help the erosion problem.

Yes, it addressed the major problems on our farm and corrected them.

Some of the things we did helped but we have not built a manure pit yet which would really help.

Yes, several times we have marveled at the distinct difference there is in not only appearance but in water quality results.

Yes, the plan was fine because we have had the expected results.

Yes, Very thorough analysis of problem.

Yes, I can only assume the water quality improved, stopping all the land erosion with grass waterways. Also the gravity fed water trough most have better tasting water than the well fed waterer or the stream. Noting my cows would walk past these to get to the trough.

Yes, we had no water pond installed Smith waterer installed in separate field excellent results.

Yes, I do. The water that runs out of the pipes into the stream looks almost clean enough to drink myself!

Yes, it would have if they would have used the proper pipe. Solid pipe was needed instead of pipe with holes.

Has helped us greatly in gaining control of livestock manure and correct ground application. Very improved animal crossings with fencing. Of course being involved with no-till & minimum till and seeing clear water.

Yes, for the most part. Could be refined to allow tile without a waterway in some unusual cases.

Yes, based on the goals of controlling manure solids and sediment in the future it may be necessary to contain all liquid from livestock.

It helped.

Yes, the cattle now drink at the 3 troughs we installed and no longer go into the streams. Half of the open streams are now enclosed in pipe. Before the projects were begun, water leaving our farm after rainstorm and heavy snow melt was muddy, now it is clear!

This project has worked very well.

Yes, we have removed cows out of creeks, collect all animal waste and all parlor and dairy waste in the manure pit.

Very helpful with respect to manure holding storage and water runoff from buildings. Need additional help on stream crossing problems.

I now have nice well drained waterways where there were hedgerows with deep gullies.

No, heavy runoff into our pond has never been corrected.

Yes, the BMP's installed on the farm were very influential in preventing erosion, runoff and other problems we were having.

Yes, because we spread manure when the proper time we don't lose soil, in the waterways all runoff of barn yard is caught and stored.

Yes, it has taken care of daily hauling of animal waste to three or four times a year hauling when weather conditions are right and manure can be incorporated immediately. It has taken care of springs which in turn renders more land useful and also provides water to animals.

Yes, we had some fields that were in much need of tile and waterways. It corrected some big problems for us.

Yes, it has curtailed erosion substantially.

Absolutely. Your field men and engineers and supervisor were professional and sympathetic to our problem. Their assistance filled omissions were my layman's deficiencies were lacking. The project solved our major problem.

The RCWP plan has helped my farm by diverting water into waterways and stopping erosion and has applied clear water water without sediment to Little Pipe Creek, improving water quality and helping me with stock waterers in using the diverted water.

Yes, it addressed the problems but only partly took care of them.

Yes, the waterway was improved and drained properly.

It is keeping the runoff from entering the stream.

No, a previous RCWP employee had us remove too many trees and relocated the contour strips which has allowed the soil to move down his expensive waterway and cut it deeper.

Yes, covered manure pit and spring development.

In the end it made a great improvement to our runoff problem.

Yes (2)

Question 2 What do you feel were strengths or weaknesses of the project as it applied to your farm operation?

A good strength was I could get the projects done on my financial schedule if I had extra money I would have gotten as much money as I needed on shares at one time. A weakness was a couple over spending on some estimates.

We received good information and service and help financially.

Strengths- (I) money (2) Flexibility to make some alterations to plan as our needs changed.

Weaknesses Not enough experience in planning some of the practices (Ex. over building to meet code)

The project is tailor-made for each operation. Each problem is addressed on its own merit and solutions are based mostly on a least cost basis.

No weaknesses, Strengths- it stopped the erosion which is what it was supposed to do; the ASCS people we worked with are very good.

Definitely the manure pit was the most important project.

I think the field manpower was good, getting through the practices smoothly was a real plus. Having plenty of time, extensions also is a real plus. I never felt pressured at any time.

Very professionally handled.

We are catching much more of the animals' waste than we did before the project.

It cleared up some wet spots.

Manure storage, animal crossings & heavy storm protection.

Strengths- The cooperation & understanding of local personnel.

Weaknesses- The lack of flexibility by the writers of the regulations and who do not work with the varying conditions that occur in most areas.

The major strengths were adequate cost sharing and flexibility of design with my wishes and ideas being incorporated. The only "weakness" in my opinion is over engineering of design increasing cost.

I think we need more control of runoff water from cropland as well as sewage disposal.

The way the project is conducted from write-up to payment could not be run more smoothly and professionally. I am sorry only that I have not written formally on my own to credit the efforts put forth by all. The cooperation between the ASCS and the Maryland Dept. of Agriculture (who funded the rebuilding of the pond) and between all offices in the Department and ASCS could not be better. From the write-up and foresight of Doug Valentine to the engineering and monitoring by Myron Frock, then later and especially to Warren Johnson and when Warren was out to Ed Saunders, all were appraised and knew the details of my project and treated me as if mine was the only project. Cooperation between the contractors and ASCS technicians was excellent and the contractors respect the abilities of the technicians. Payment was prompt and Susan Stonesifer made submitting the bills and paperwork a breeze.

As important as ease of implementation was to me, it is reassuring to see that the project achieves the desired results and I think it has. It would be nice to know the chemical quality of the water leaving our farm but I guess that would be hard to measure. However, I do know that we no longer have the large algae blooms on our pond and after a 3 1/2 rainstorm two weeks ago the water leaving the farm was clear.

All persons in ASCS and SCS were very helpful.

The heifer manure pit still has a lot of rain runoff go to creek.

Financial assistance for major projects-major strength.

The strengths are the manure pits which enable to put the manure on the fields before we plant to enable better use of the nutrients.

Very good cooperation with Doug and the rest of the group.

Top soil and sediment is floating out of pond and down stream.

Strengths- The waterways and drainage combined with stripcropping definitely improved the use of our ground while eliminating erosion. Weakness- Our spring development is seasoned due to red ground springs.

I would like to commend all the people I have dealt with at ASCS. All have been more than willing to try to accommodate my needs over the past 9 years. Strengths- manure storage, waterways collect barnyard runoff.

In general the SCS were helpful with suggestions and implementations of the practices.

For our farm, the project was all positive. There isn't one area that isn't better now since the waterways were put in.

Makes maintenance of waterways very easy. Allows farm machinery to travel through fields more easily.

The length of time from first application until plans were approved seemed excessive.

The program has very helpful projects for farms to stop erosion and other means of cleaning up waste and preventing it from polluting the creeks and waterways.

I feel the program is excellent and the ASCS office is doing a great job from the office personnel to the field personnel who are so helpful.

The idea is great but you have to realize the cost to the farmers is a dead expense and they can only afford so much.

My project was not big enough to get a good feel for any problems.

Better manure products when applied and only needs to be applied when fields are dry.

The deep ditch has made it impossible to cross with machinery.

Improved water quality and erosion control (waterways).

Weaknesses throughout the project have centered around the reluctance of the planners to foresee that the design of the BMP's were inadequate. In two possibly three separate instances we had to amend our projects simply because the surveyors or planners didn't see the whole picture. Diversions were not extended far enough and when they were initially completed, actually made the problem that they were designed to solve worse. That required further survey and the delays in re-hiring contractors. The last re-examination or check-up over two years ago resulted in another resurvey with the understanding that an additional practice or addendum to previous work would be forthcoming. We never heard another word.

Finally, throughout the experience, we had the continuous feeling that our farm; because we raise horses, wasn't worth the effort....that we're not "real" farmers! Whether or not that attitude actually existed is a mute point. We have always felt that the over-riding concern should be what can be done for the RCWP and how can it be achieved efficiently & expeditiously.

Question 3 What could be done to improve further similar projects?

An improvement, if it could be done, would be if the farmer went over $50,000 some money from another farmer completed less than $50,000 would be transferred to help recover some money.

I spent a great deal of time looking at other peoples projects. However for those who don't have the time a video could be made to show projects etc.

Possibly a prepayment or a progressive payment would help to alleviate some extraordinary expense during project.

None that I know of for our particular problem.

Spend more time face to face with participant, maybe helping him set priorities regarding improvements.

We do not know of any improvements. We think everything was done that could be.

The same.

Maybe some heifer lot containment.

In my situation I would like to see some tile work without a waterway where runoff is not a serious problem.

Little

I think the program was great.

Suggest that all waste pits have easy method to enter in order to remove heavy sludge that collects on bottom of pit.

This project must be completed to rest of runoff into Pipe Creek.

Most manure storage is not big enough.

Sometimes projects are large and take some time to complete, if these projects could be broken into three groups such that full payment could be received for each segment. Sometimes it was a burden to pay the contractor and still keep cash flow for operation business.

The only way to improve would be to continue the project. There are probably still a lot of problem areas around the county.

To this writer's knowledge, our request was the first of it's kind and therefore any similar project in the future should move more quickly.

More government money applies to the program for more useful projects such as those done on my farm.

Have a much higher limit that would be for a percentage (perhaps 75%) of costs over 50,000.

Things were fine.

Do not disturb well established tree lots.

Don't know.

No opinion.

Nothing

No suggestion.

Question 4 Are there any other practices that you would like to see included in further programs?

Pond construction.

Concrete crossings where cattle need to cross waterways with fences on either side of the walkway would greatly help. (Blacktop my driveway to get rid of the mud- just kidding.)

All are covered as far as I'm concerned.

None that I can think of

I think completely fencing cattle out of streams should be part of the practice and a requirement. Also contour farming should be required.

Review of water needs by section of farm and recommendations.

None that we can think of.

Always nice to have some help on special equipment purchases.

Ponds should be allowed because they give waterfowl a nesting and resting place. Ducks and geese are definitely on the increase in this area.

I think we have to comply with CPA guidelines as much as possible.

In these days of reduced budgets I am sure it would be hard to justify, but on our farm a lot of stormwater runs long distance down a gravel driveway covered with limestone. I wonder if others in steeply rolling topography have similar problems and if cost sharing would enable to reduce the accelerated runoff and possible chemical alteration of these waters.

One area was overlooked or forgotten.

Stream crossing higher % of funding

Tiling of fields

Sediment control around pond to stop erosion of top soil into Pipe Creek.

Ponds construction

Anything that helps to improve our creek's water quality would be a good practice.

I don't believe so, at least on my farms.

Any program which can retard erosion or pollution migrating into our streams would be a worthy candidate.

Do not allow one employee to "cover-up" for another's mistakes.

Not really.

No (8)

Question 5 How did you feel about the $50,000 maximum payment per farmer?

That was sufficient.

The high cost of industrial equipment and manure storage facilities that are large enough, take $50,000 in short order.

I feel it is a reasonable amount.

Very nice!

This seems fair to all concerned unless there is an extraordinary expense in implementing critical plan.

Sufficient for our needs - think it is enough anyway.

Very fair.

For my farm size and operation this was sufficient, but looking at other larger operations I think maybe this should be determined on land contour and animal concentration.

I think on the surface its adequate. Further information might change my opinion.

This is great because without this assistance many of us small farmers would not be able to afford fixing things.

This is fair.

Very much of a handicap when needed continual projects could be completed in a particular farm program.

It is good for me as I don't have many livestock, but it is wrong in general. The cap should be higher & figured using a formula that includes the location of farm in relation to streams, by per acre & by type of animals.

In my case it was adequate. Large operations may feel differently. Future programs need to consider rising costs and budget restraints.

I think it was a generous amount allowed at time we started.

Not a problem for me.

Did not apply to this project.

I think it was adequate for each farmer, you shouldn't be a hog.

Satisfactory ag way to spread available funds over a 3 to 5 year period and should be able to submit new projects and receive additional funds if available after 3 years.

It enables us to build manure facilities we wouldn't have been able to afford before.

For the most part 50,000 is enough. Some large producers with several farms and need for manure storage it is not enough.

Adequate at the time practices were installed. Cost shares need to be reevaluated as expenses increase.

No thought or feelings.

Was not a problem with our farm although I could see where it could be a problem with a larger farm.

It's unfair. The persons with 25 acres gets as much as the farmer with three.

I feel some farmers did not have sufficient need for $50,000 and others needed more. I feel it should be broken down by size of farm and size of operation.

In most cases it is probably enough. I think that the type and size of the operation and the amount of problems should be considered.

I believe $50,000 is quite adequate.

Any budget must have a cap. Different projects require a difference in costs. However, the allotment is sufficient to establish most local needs, or at least make a substantial contribution towards completing any undertaking.

I think this is a fair amount, but should be increased construction costs increase a certain percent each the amount should increase the same percent.

It's dumb certainly its plenty of money for small projects but inadequate for larger ones where improvements are more important.

Seems to be adequate.

Need not be increased.

Fair

For the work that our farm required, that amount was more than adequate.

Question 6- Do you feel that you will be able to maintain the conservation improvements that have been installed on your farm through the project efforts?

I feel maintaining the practices will be easy, compared to the time involved in getting them completed.

I don't know what the projects efforts are as far as maintenance. To date there hasn't been a problem maintaining the improvements myself.

Yes, and expect to improve other conservation efforts.

Erosion still persists.

Reasonably so, when dealing with erosion and sediment disposal can be difficult at various times for example, wet year versus dry year.

Yes, we try to keep watch on the improvements.

There is no question in my mind that it will be well maintained.

Yes, capital improvements are the responsibility of the business and should not become a liability to tax payers.

Yes, without government help.

The answer to this is dependent on the weather. Since the BMP's weren't completed well enough to solve the initial problems, they still exist, and will continue to deteriorate.

Yes (26)

Question 7 Have other farmers looked at or asked about the soil conservation measure or animal waste facilities that you have completed?

Others not only farmers have admired the waterway improvements, nice diversions, strips, and especially the spring development. I can't wait to complete the manure facilities.

No, just some want to know what that thing that looks like a outhouse is doing in the meadow. monitoring stations

I have had numerous groups tour my farm from kindergartners to Washington bureaucrats to show what the farmer is doing concerning water quality.

Many

Yes, most wished they had the opportunity I had but being renters or not in the right area won't make the investment even cost share.

Not to my knowledge.

Not much but I have been impressed by other farm projects and their satisfaction.

Yes, and it encouraged a farm to undertake & complete a tile & waterway project. Local homeowners have also commented on the appearance.

Only a passing interest.

Yes, inspected animal waste facilities.

Yes, most seem very interested.

Yes, some would like to duplicate them, while others are different. Seems what works for one does not totally work for others.

We have been asked about the success and given them positive reports.

Quite a few have seen and asked about the soil conservation measures on my farms. I do not have animal waste facilities.

Yes as well as university groups who made field trips to our farm. Other projects have used our project as a model to our understanding. It is an asset to both the farm and the community.

No (5)

Yes (15)

APPENDIX 1

USDA-SCS

STATUS REVIEW

RCWP - 1991

SCS-CPA-013
ASRs #1

County: Carroll Date: Contract No.: XX

Name: John Q. Public Address: 1234 Anytown Road
Some Place, Maryland

Progress in applying plan:

The following items have been completed on this contract: #1 - manure storage pit at cow barn; #2 - manure storage pit at heifer barn; #3 - waterways #1, #2, #3 & #4 and #4 - field strips in field #4.

Items left in contract: #5 - modification to existing animal waste management system at cow barn and #6 & #7 - waterways #5 & #6.

Mr Public is endeavoring to properly maintain all completed items.

Revision of plan or modification of contract needed:

A modification has been cut to re-schedule all of the remaining items for 1991. All work needs to be completed by 12/31/91 when this contract reaches its' 10 year limit.

Need for technical assistance:

SCS has completed the designs and quantity sheets for all of the remaining contract items. And these has been given to Mr Public.

Prepared By: Douglas A. Valentine, S.C.

Signed _____ _____
District Conservationist Participant